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MISSOURI - SOURIS - RED RIVER BASINS, STUDY PLAN FOR A COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM

Public Health Service
Kansas City, Missouri

January 1965

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MISSOURI - SOURIS - RED RIVER BASINS

STUDY PLAN
FOR A
COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM

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U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Public Health Service
Division of Water Supply and Pollution Control
Region VI, Kansas City, Missouri

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General Publications

M69o/ Jan. 1965

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HEW
Public Health Service
Division of Water Supply and Pollution Control
Region VI, Kansas City, Mo.

(no LC number)

STUDY PLAN

FISCAL YEAR 1966

This Study Plan is prepared for specific use of the Division of Water Supply and Pollution Control, Public Health Service. The Study Plan is not to be distributed without prior approval of competent authority.

MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

PUBLIC HEALTH SERVICE

DIVISION OF WATER SUPPLY AND POLLUTION CONTROL

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MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

INTRODUCTION

This study plan represents background material required for a program review of the Missouri-Souris-Red Rivers Basins Project. It contains information relative to budget, personnel, administrative and operational procedures likely to be encountered during the duration of the project.

Each individual activity described in this plan is an integral part of the entire project and is necessary to the final report. To assure desirable planning and efficient utilization of the resource of the project, early development of the program evaluation and review technique diagram showing the inter-relationship of each major activity and permitting the development of a critical path of program operation is essential. The work on the comprehensive project will have to be closely coordinated with the work of the Missouri Basin Inter-Agency Committees Comprehensive Framework Study. Existing data will be used in the development of the Type I study which is proposed by the Inter-Agency Committee.

The scheduling of work will also have to include the development of water supply and quality control reports for the Federal agencies, both within the boundaries of the river basins being studied and those within the states of the region.

The other Federal departments are involved in two types of comprehensive studies. A Type I, or framework study and a Type II study. The Type I framework study covers major river basins and develops general dimensions of water resources, water resource problems by periods of time and by broad stretch of river. The Type II study covers subbasins of the major river basins and develops data specific enough to permit site selection in the establishment of scale, of storage projects, or other structural developments. This office will make every effort to provide information to the other agencies in the form and context best suited for their activities. Although the comprehensive water pollution control program cannot be put in either Type I or Type II categories.

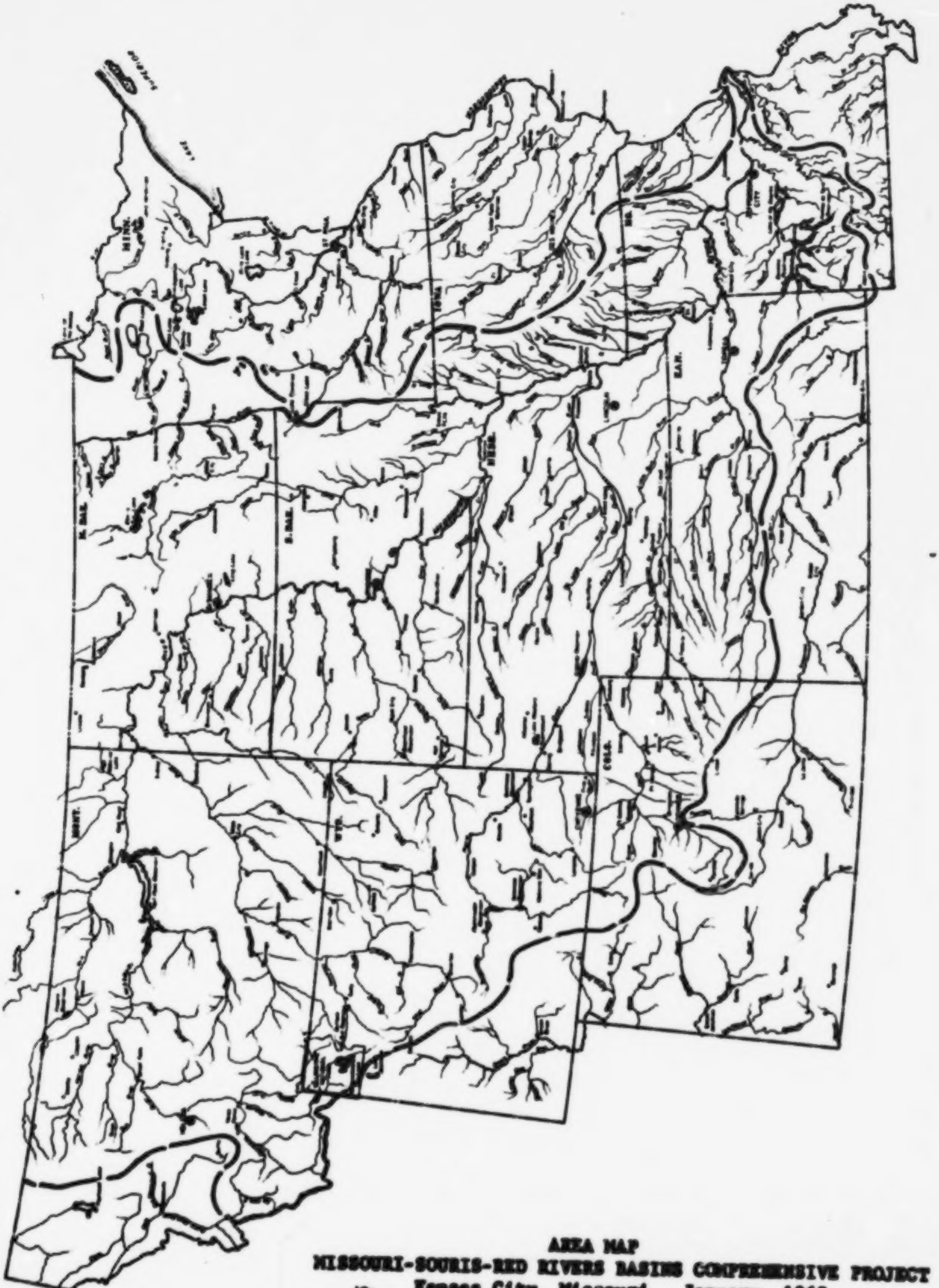
The development of comprehensive programs for water pollution control requires specific investigation, concentrating on sources of pollution, possibilities for treatment at the source, dynamic response of water systems to various types of pollution, and even specialized economic projections of water use and waste water discharges. The program's objectives is to develop a cooperative plan which will have continuing participation of the industries and private citizens as well as municipal, State, and Federal agencies.

A distinction in degree or kind of investigation is not recognized in the effort to develop or establish comprehensive water pollution control programs. Within the meaning of Section 2 (a) of the Federal Water Pollution Control Act, the wording of the act is as follows:

> "The Secretary shall, after careful investigation in cooperation with other Federal agencies, the State Water Pollution Control agencies, and Inter-State agencies, and with the municipalities and industries involved, prepare or develop comprehensive programs..."

The act also authorizes the Secretary to make joint investigations with the groups mentioned. Our goal shall be to develop an effective water pollution control program in full concert with all of the

Federal, State, Inter-State, municipal and private interests of the Missouri Basin. Our active participation in Missouri Basin Inter-Agency activities and cooperation with members of the Standing Committee for Comprehensive Planning, Work Groups and Task Forces of the Missouri Basin Inter-Agency Committee and officials of other State agencies not directly represented on the Committee will be most helpful in the development of the program.



AREA MAP
MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT
Kansas City, Missouri January 1965

FACT SHEET

NAME OF PROJECT: MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

PROJECT LOCATION:

Headquarters
560 Westport Road
Kansas City, Missouri 64111
BA 1-7000, Extension 5251
Lewis A. Young, Acting Director
Charles H. Hajinian, Regional Economist

DATE PROJECT AUTHORIZED: Fiscal Year 1966
July 1965

PROJECT BUDGET: ($1,000)

	FY 66	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72
Direct (Actual)	300.0	800.0	800.0	900.0	900.0	800.0	500.0

PROJECT POSITIONS: (Actual)

	FY 66	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72
Permanent	24	40	50	60	60	60	40
Temporary	1	2	10	10	10	10	10

STATES INVOLVED IN PROJECT AREA:

State	Square Miles in Rivers Basins
Colorado	22,000
Iowa	15,000
Kansas	44,000
Minnesota	22,000
Missouri	36,000
Montana	134,000
Nebraska	76,600
North Dakota	69,500
South Dakota	76,400
Wyoming	77,500
Total Basins Area	573,000

IMPETUS FOR START OF PROJECT:

The Missouri Basin Inter-Agency Committee adopted at its June, 1964 meeting an outline of work for a comprehensive framework study for the Missouri Basin. A standing committee was established to carry on the coordination of the work of the Federal agencies and States in accomplishing a Type I Comprehensive Framework Study of Water and Related Land Resources Development of the Missouri Basin. A copy of the work outline and of the coordinated budget estimates for the Federal agencies is attached to this report.

The chairman of the Standing Committee for Comprehensive Planning in transmitting the coordinated budgets pointed out that a delay of the intensive phase of the Department of Health, Education, and Welfare program would adversely affect development of the study and stated the Public Health Service Missouri River Comprehensive Study requires immediate funding by direct appropriation and authority for staffing so that the Public Health Service can timely provide water supply and water quality data to other cooperating agencies.

The development of comprehensive programs for water pollution control, however, requires specific investigations concentrating on sources of pollution, possibilities for treatment at the source, dynamic response of water systems to various types of pollution, and even specialized economic projections of water use and waste water discharges. Such programs cannot be put in either Type I or Type II categories. In order to develop an effective water pollution control program, in full concert with all of the Federal, State, Inter-State and private interests in the Missouri Basin requires immediate authorization of the Missouri-Souris-Red Rivers Basins Comprehensive Programs with adequate funding and authorization for staffing.

Recent Population Census

The Missouri River Basin contains a total of 425 counties, counting Yellowstone National Park as one. The Red River of the North embraces 36 counties which makes an overall total of 461 counties. Summary of Population data for 1950 and 1960 are shown below.

Summary of Population by Region
Missouri River Basin and Red River of the North
1950 - 1960

1950 Population	Missouri River Basin	Red River of the North
Total	7,063,441	581,692
Urban	3,473,088	157,828
Rural	3,590,353	423,864
1960 Population		
Total	7,931,103	573,321
Urban	4,555,954	192,572
Rural	3,375,149	380,749

Although the Missouri River Basin comprises about one-sixth of the area of the conterminous United States, the basin's population in 1960 represented less than five percent of the national total. From 1950 to 1960, the national population increased 18.4 percent, while the population in the Missouri River Basin increased 12.3 percent.

The predominant rural character and declining farm population has been largely responsible for the basin's decreasing relative position. Comparative changes in rural population from 1950-1960 shows a basin decline of 6.0 percent compared to a national decline of less than 1.0 percent.

The urban population growth in the basin has been almost synonymous with urban gains nationally. Actually, the percentage increases in the basin's urban population from 1950-1960 was 31.2 percent, while nationally the urban increase was 29.3 percent. The table below depicts a comparison of population in the Missouri River Basin and in the conterminous United States.

Comparison of Population in the Missouri River Basin and in the Conterminous United States

1950 - 1960
(Thousands)

	Conterminous United States		Missouri River Basin		Missouri River Basin's percent of United States
	Number	Percent	Number	Percent	
1950					
Total	150,698	100.0	7,063	100.0	4.7
Urban	96,468	64.0	3,473	49.2	3.6
Rural	54,230	36.0	3,590	50.8	6.6
1960					
Total	178,464	100.0	7,931	100.0	4.4
Urban	124,699	69.9	4,556	57.4	3.7
Rural	53,765	30.1	3,375	42.6	6.3
Percent Change 1950-1960					
Total Population		+18.4		+12.3	
Urban		+29.3		+31.2	
Rural		- 0.9		- 6.0	

Summary of Population in Standard Metropolitan Statistical Areas Missouri River Basin and Red River of the North 1950, and 1960

SMSA	Regions	1950	1960	Change
Missouri				
Great Falls, Montana	Upper Missouri	53,027	73,418	+38.5
Billings, Montana	Yellowstone	55,875	79,016	+41.4
Sioux Falls, So. Dakota	Eastern Tribs.	70,910	86,575	+22.1
Denver, Colorado	Platte	612,128	929,383	+51.8
Lincoln, Nebraska	Sioux C. Kansas C.	119,742	155,272	+29.7
Omaha, Nebraska	Sioux C. Kansas C.	366,395	457,873	+25.0
Sioux City, Iowa	Sioux C. Kansas C.	114,318	120,017	+ 5.0
St. Joseph, Missouri	Sioux C. Kansas C.	96,826	90,581	- 6.4
Kansas City, Missouri	1/	848,655	1,092,545	+28.7
Topeka, Kansas	Kansas	105,418	141,286	+34.0
Springfield, Missouri	Lower Mo. Trib.	104,823	126,276	+20.5
Missouri Basin total eleven SMSA's		2,548,117	3,352,242	+31.6
Red River of the North				
Fargo-Moorhead, No. Dakota		89,240	106,027	+18.8

1/ Sioux C.-Kansas C., Kansas, Lower Mo. Tr.,

Population of Urban Places
Missouri River Basin
1950 and 1960

Region	City	State	County	1950	1960	Change
25,000 to 50,000 in 1960						
Western Tribs.	Rapid City	So.Dakota	Pennington	25,310	42,399	+67.5
Eastern Tribs.	Bismarck	No.Dakota	Burleigh	18,640	27,670	+48.4
Platte	Casper	Wyoming	Natrona	23,673	38,930	+64.4
Platte	Ft.Collins	Colorado	Larimer	14,937	25,027	+67.6
Platte	Greeley	Colorado	Weld	20,354	26,314	+29.3
Platte	Cheyenne	Wyoming	Laramie	31,935	43,505	+36.2
Platte	Grand Island	Nebraska	Hall	22,682	25,742	+13.5
Kansas	Lawrence	Kansas	Douglass	23,351	32,858	+40.7
Kansas	Salina	Kansas	Saline	26,176	43,202	+65.0
Lower Mo. Tr.	Columbia	Missouri	Boone	31,974	36,650	+14.6
Lower Mo. Tr.	Jefferson City	Missouri	Cole	25,099	28,228	+12.5
Total				264,131	370,525	+40.3

Population of Urban Places
Missouri River Basin
1950 and 1960

Region	City	State	County	1950	1960	Change
		10,000 to 25,000 in 1960				
Upper Mo.	Helena	Montana	Lewis & Clark	17,581	20,227	+15.0
Upper Mo.	Bozeman	Montana	Gallatin	11,325	13,361	+18.0
Upper Mo.	Havre	Montana	Hill	8,086	10,740	+32.8
Yellowstone	Sheridan	Wyoming	Sheridan	11,500	11,651	+ 1.3
Western Tribs.	Mandan	No. Dakota	Morton	7,298	10,525	+44.2
Eastern Tribs.	Jamestown	No. Dakota	Stutsman	10,697	15,163	+41.8
Eastern Tribs.	Williston	No. Dakota	Williams	7,378	11,866	+60.8
Eastern Tribs.	Huron	So. Dakota	Beadle	12,788	14,180	+10.9
Eastern Tribs.	Aberdeen	So. Dakota	Brown	21,051	23,073	+ 9.6
Eastern Tribs.	Mitchell	So. Dakota	Davison	12,123	12,555	+ 3.6
Eastern Tribs.	Pierre	So. Dakota	Hughes	5,715	10,088	+76.5
Eastern Tribs.	Brookings	So. Dakota	Brookings	7,764	10,558	+36.0
Eastern Tribs.	Watertown	So. Dakota	Codington	12,699	14,077	+10.9
Platte	Laramie	Wyoming	Albany	15,581	17,520	+12.4
Platte	Sterling	Colorado	Logan	7,534	10,751	+42.7
Platte	Kearney	Nebraska	Buffalo	12,115	14,210	+17.3
Platte	No. Platte	Nebraska	Lincoln	15,433	17,184	+11.3
Platte	Scotts Bluff	Nebraska	Scotts Bluff	12,858	13,377	+ 4.0
Platte	Columbus	Nebraska	Platte	8,884	12,476	+40.4
Sioux C.) Kansas C.)	Atchison	Kansas	Atchison	12,792	12,529	- 2.1
Sioux C.) Kansas C.)	Fremont	Nebraska	Dodge	14,762	19,698	+33.4
Sioux C.) Kansas C.)	Norfolk	Nebraska	Madison	11,335	13,640	+20.3
Kansas	Hayes	Kansas	Ellis	8,625	11,947	+38.5
Kansas	Hastings	Nebraska	Adams	20,211	21,412	+ 5.9
Kansas	Beatrice	Nebraska	Gage	11,813	12,132	+ 2.7
Kansas	Junction City	Kansas	Geary	13,462	18,700	+38.9
Kansas	Leavenworth	Kansas	Leavenworth	20,579	22,052	+ 7.2
Kansas	Manhattan	Kansas	Riley	19,056	22,993	+20.7
Lower Mo. Tr.	Kirksville	Missouri	Adair	11,110	13,123	+18.1
Lower Mo. Tr.	Moberly	Missouri	Randolph	13,115	13,170	+ 0.4
Lower Mo. Tr.	Fulton	Missouri	Callaway	10,052	11,131	+10.7
Lower Mo. Tr.	Sedalia	Missouri	Pettis	20,354	23,874	+17.3
Lower Mo. Tr.	Ottawa	Kansas	Franklin	10,081	10,673	+ 5.9
Lower Mo. Tr.	Rolla	Missouri	Phelps	9,354	11,132	+19.0
Total				425,111	501,788	+18.0

MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

Mainstream and Major Tributaries

Name of River	Where River Rises	River Mileage
Missouri	Montana	2464
Gallatin	Montana	120
Jefferson	Montana	207
Madison	Montana	183
Sun	Montana	126
Milk	Montana	687
Yellowstone	Wyoming	671
Powder	Wyoming	486
Tongue	Wyoming	265
Big Horn	Wyoming	336
Little Missouri	Montana	560
Cannonball	North Dakota	295
Grand	South Dakota	329
Moreau	South Dakota	373
Cheyenne	South Dakota	340
Belle Fourche	Wyoming	316
White	Nebraska	507
James	North Dakota	710
Platte	Nebraska	310
Elkhorn	Nebraska	333
South Platte	Colorado	442
North Platte	Wyoming	680
Kansas	Kansas	175
Republican	Colorado	544
Smoky Hill	Colorado	562
Big Blue	Nebraska	287
Grand	Iowa	217
Osage	Kansas	496
Platte	Iowa	253
Chariton	Iowa	280
Gasconade	Missouri	270
Red River of the North	Minnesota South Dakota	394
Souris	Canada	360

U.S. Department of Health, Education & Welfare
Public Health Service Region VI
Kansas City, Missouri January 1965

NATIONAL WATER POLLUTION SURVEILLANCE SYSTEM SAMPLING STATIONS LOCATED IN REGION VI

Number	River	Location	State
2	Arkansas	Coolidge	Kansas
16	Lake Superior	Duluth	Minnesota
23	Mississippi	Cape Girardeau	Missouri
25	Mississippi	Burlington	Iowa
26	Mississippi	Dubuque	Iowa
27	Mississippi	Red Wing	Minnesota
28	Missouri	St. Louis	Missouri
29	Missouri	Kansas City	Kansas
30	Missouri	St. Joseph	Missouri
31	Missouri	Omaha	Nebraska
32	Missouri	Yankton	South Dakota
33	Missouri	Bismarck	North Dakota
34	Missouri	Williston	North Dakota
69	Red River	Grand Forks	North Dakota
80	Big Sioux	Sioux Falls	South Dakota
86	Platte	Plattsmouth	Nebraska
94	North Platte	Henry	Nebraska
96	Rainy	Baudette	Minnesota
101	Rainy	International Falls	Minnesota
108	Missouri	Missouri City	Missouri
128	Kansas	De Soto	Kansas

Total 21 Stations

GAGING STATIONS WHICH ARE SENDING IN STREAMFLOW DATA FOR EACH OF THE WPSS STATIONS

WPSS Station	Gaging Station Location
Baudette, Minn. (96)	Rainy River at Manitou Rapids
International Falls, Minn. (101)	Fort Francis, Ontario
Bismarck, North Dakota (33)	Bismarck, North Dakota
Grand Forks, North Dakota (69)	Grand Forks, North Dakota
Williston, North Dakota (34)	Williston, North Dakota
Burlington, Iowa (25)	Keokuk, Iowa
Dubuque, Iowa (26)	McGregor, Iowa
Henry, Nebraska (94)	Wyoming-Nebraska State Line
Missouri City, Missouri (108)	Boonville, Missouri
St. Louis, Missouri (28)	Hermann, Missouri
Cape Girardeau, Missouri (23)	Thebes, Illinois
Red Wing, Minnesota (27)	Prescott, Minnesota
Omaha, Nebraska (31)	Omaha, Nebraska
Plattsmouth, Nebraska (86)	South Bend, Nebraska
Sioux Falls, South Dak. (80)	Brandon, South Dakota
Yankton, South Dakota (32)	Yankton, South Dakota
De Soto, Kansas (128)	Bonner Springs, Kansas
Coolidge, Kansas (2)	Coolidge, Kansas
Kansas City, Kansas (29)	Kansas City, Missouri
St. Joseph, Missouri (30)	St. Joseph, Missouri

There are 20 Gaging Stations related to WPSS Stations...no Streamflow data from Duluth since it is located on a lake.

FISH KILLS IN REGION VI DURING CALENDAR YEAR 1964

MONTH STATE	NUMBER OF FISH KILLS	TOTAL KILLED	CAUSE
JANUARY			
Missouri	3	7,150	Sewage Plant Overload, Raw Sewage, Silt Waste
FEBRUARY			
Iowa	1	10,000	Gasoline
Minnesota	2	2,030	Industrial Waste, Unknown
Missouri	1	10,000	Sewage Plant Overload
MARCH			
Minnesota	1	100	Unknown
Missouri	3	7,000	Sewage Plant Overload, Unknown
APRIL			
Iowa	1	6,000	Ammonia-Nitrogen
MAY			
Iowa	2	2,500	Industrial Waste, Raw Sewage
Missouri	14	314,950	Pesticides, Industrial Waste, Unknown
Nebraska	7	16,900	Rain, Fertilizer, Water removed for irrigation, Pesticides, Feedlot run off
JUNE			
Iowa	6	20,700	Industrial Waste, Sewage Plant Overload, Unknown
Missouri	5	45,225	Pesticides, Feedlot Run off, Unknown
JULY			
Iowa	1	1,000	Heat
Missouri	4	32,250	Pesticides, Feedlot Run off, Raw Sewage
Nebraska	2	7,869	Pesticides, Heat
AUGUST			
Iowa	2	47,400	Sewage Plant Overload, Low Water
Missouri	4	20,000	Industrial Waste, Pesticides, Sewage Plant Overload, Low Water
Nebraska	2	39,060	Disease, Unkown
SEPTEMBER			
Iowa	2	5,300	Pesticide, diesel fuel
Missouri	1	300	Pipeline break

ENFORCEMENT ACTIONS

HEARINGS

The combined efforts of the Public Health Service and the State water pollution control agencies resulted in Federal enforcement actions in the following areas of the basin:

Big Blue River Area, Nebraska-Kansas	May 3, 1957
Omaha, Nebraska, Nebraska-Iowa-Missouri-Kansas	June 14, 1957 July 21, 1964
St. Louis Metropolitan Area, Missouri-Illinois	March 4, 1958
Sioux City, Iowa, South Dakota-Iowa-Nebraska-Kansas-Missouri	March 23-27, 1959
St. Joseph, Missouri, Missouri-Kansas	July 27-30, 1959
Kansas Citys Metropolitan Area, Kansas-Missouri	June 13-17, 1960
Scottsbluff, Nebraska, Wyoming-Nebraska	September 1961 March 1962 November 20, 1963

SURVEYS AND STUDIES

A stream survey ran in mid-July, 1964 on Big Blue River Area was made to determine if pollution abatement facilities were adequate.

An inspection of packing plants in Omaha, Nebraska, was made during November, 1964.

An intra-state enforcement study is being made on the South Platte River at the request of the Governor of Colorado.

PROGRAM CONTENT

PROGRAM PLANNING FOR
MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT
FISCAL YEAR 1966

OBJECTIVES:

The objectives of the Public Health Service's study is to develop an effective comprehensive water quality and pollution control program cooperatively with all the Federal, State, Inter-State and private interests in the Missouri Basin. Comprehensive water pollution control planning is directed towards the development of long range guide lines designed to provide a regulated supply of clean water, available for all legitimate uses, to the present and future population of a given geographic area. The major elements involved in each study include the forecasting of economic growth, computation of stream flow and removal requirements for reducing pollutants concentrations, and development of technical administrative means for operating the river system to insure optimum water quality and pollution control. Concurrently~~, the project staff~~ the program will will work ~~with and~~ supply the data needed for the development of the Comprehensive Framework Plan of the Missouri Basin Inter-Agency Committee.

Staff members have been assigned key positions in the development of the Missouri Basin Inter-Agency Committee plan.

BRIEF DESCRIPTION OF BASIN:

The Missouri River, the longest river in the United States, flows 2,464 miles from Three Forks, Montana to its mouth. The river joins the Mississippi a few miles above St. Louis, Missouri. The river system drains an area of 529,000 square miles of the United States and Canada of which about 9,700 square miles lie north of the international boundary. The area in the United States is about one-sixth the total area of the nation and includes parts of all of ten states. By far the greater part of the area is comprised of rolling or gently sloping plains and prairies, bordered on the west by the Rocky Mountains with the Ozark Highlands to the south. Within the plains area, the Black Hills of South Dakota are a principle topographic feature. The Red River of the North and its tributaries flow into Canada. This river system drains approximately 44,000 square miles of the United States.

The Missouri River, with its tributaries, rises to elevations of 14,000 feet and empties into the Mississippi River at elevation of 400 feet. The maximum, average, and minimum flows at the mouth are about 900,000; 83,000; and 4,000 cubic feet per second, respectively. The Missouri River has 30 major tributaries, varying in length from 100 to 1,000 miles, and draining areas varying in size from 2,400 square miles to 90,000 square miles.

The area has widely divergent climatic characteristics. Average annual rainfall ranges from about 6 inches for a limited area in the northwestern plains to 44 inches in the lower basin. Seasonal rainfall over most of the basin is highly variable, and the annual rainfall can vary from less than one-half normal to several times the normal rainfall. There is also a wide range in temperatures, from -60° to 120° F., with below zero to over 100 degrees being experienced over much of the basin.

The basin has approximately 113 million acres in cropland, 175 million in grassland, 45 million in forest and woodland, and 7 million acres in other uses, totaling 340 million acres. Nearly two-thirds of the western plains is in grass, while in the lower basin and eastern plains nearly one-half of the land is used for crops. Forests and woodlands are important in the Rocky Mountains, Black Hills, and Ozark Highlands. About 4½ million acres, or 1½ percent of the farmlands are irrigated, 7 percent of the approximately 550,000 farms report some irrigation. The basin contains approximately 25 percent of the farmland of the nation. It produces more than one-third of the nation's wheat and sugar beets, nearly one-half of the rye and flaxseed, and includes between one-fourth and one-third of the nation's acreage of corn, oats and barley. Sales of livestock and wool amount to over one-fourth of the nation's total.

Agricultural enterprises, including processing of agricultural products, are the principal business and provide jobs for about one-third of the employed persons within the region. A major economic contribution in several basin states is made by business in connection with tourists attracted by the recreation and wildlife resources.

In 1962 the ten Basin States produced 47 different mineral commodities valued at $2,371 millions which is indicative of current development and the potential. Total population (1960) is about 7½ million, of which more than three-fifths live in urban areas. Population density is much higher in the eastern portion with most of the large cities located along the major streams. The farm population varies from over ten people per square mile in the eastern portion of the basin to less than two per square mile in the northwestern half of the basin. In recent years there has been a trend of people moving from rural to urban areas. On an overall basis the population of the basin has not kept up with the national rate of increase, indicating emigration of the basin's residents. This has caused concern because indications are that it is the younger generation which is leaving.

LONG RANGE GOALS:

The long range goals of the Missouri-Souris-Red Rivers Basins Comprehensive Program are:

1. The development of long range guide lines designed to provide a regulated supply of clean water available for all legitimate uses to the present and future population of given geographic areas. The development of the guide lines to be accomplished by consultation with officials and leaders in the project area and by economic studies and projections to determine the probable and desirable uses of specific portions of streams and other waters during a fifty year period covered by the study.

2. To seek out those areas where water pollution may, during the fifty year study period, interfere with projected beneficial uses.

3. To determine and evaluate alternate means to reduce the effects of pollution below the threshold of interference with reasonable use.

4. To stimulate local, State, and Federal initiative to implement water pollution control through suitable legislation, adequate financing, and active regulatory control.

5. To keep the developed water pollution control plan current by readily retrievable data, by constant up-dating, and by continuous surveillance.

The plan of attack to achieve the above listed goals is:

1. Through economic base studies and projections and engineering reconnaissance determine the location and magnitude of probable critical pollution loads to be expected during the fifty year study period.

2. Pinpoint areas requiring intensive study by biological examinations to determine the well-being of the stream as evidenced by the presence of normal biota. A reconnaissance of the stream systems will be used to determine areas which have been exposed to excessive organic or toxic wastes.

3. Cooperation with the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee, Federal, State and local agencies and other interested groups in the study area to determine the location and probable effect of man made structures affecting the water resources, such as storage, drainage, diversion, channeling, and so forth.

4. Install the STORET System of Water Quality Data Storage and Retrieval to facilitate the use and analysis of available data and data which will be obtained during the study.

5. Determine the assimilating capacity of critical

reaches of streams and any other bodies of water during critical periods of time, analyzing conditions of low flow and high temperature periods for organic loadings and high flow and low temperature conditions for maximum bacteriological effects.

6. Project previously determined stream and pollution load characteristics to anticipate a condition of maximum loading and minimum assimilating capacity.

7. For selected critical areas, determine alternatives including cost benefits and liabilities by which water of adequate quality to permit desired uses can be assured, working cooperatively with the Missouri Basin Inter-Agency Committee for Comprehensive Planning in the evaluation of such alternatives.

8. Coordinate efforts involving all levels of government to implement the study by selecting the most acceptable alternatives to secure desired water uses, and establishing a time table for the development of resources in a basin wide water quality management plan.

9. With the assistance of Federal-State Coordinating Committees, design a follow-up program with minimum Federal participation to assure that the developed plan is kept current with changing conditions, responsive to changing needs, and alert to abate unnecessary degrading of water quality.

10. Prepare a report summarizing actions taken, data accumulated, conclusions reached, and recommendations.

To implement the plan of attack, one of the first orders of business will be the development of a PERT DIAGRAM for scheduling of all activities.

Early installation of the STORET System is planned which will require the development of river mileage code and the assembling of all available data. Interest has been shown by the States who have offered to assist in storing their data by this method.

Members of the staff of the Regional Office, Water Resources Section, have been given key positions in the Work Groups of the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee. Staff members have been assigned as chairmen of Work Groups or Task Forces relating to field of water supply, water quality, and water quality control. A staff member is chairman of Work Group V which is assigned the responsibilities of developing working papers for each of the nine regions of the Basin. These working papers are the documents which will be used in developing the Type I Framework Comprehensive Plan. The scheduling of the development of these working papers is shown on the Comprehensive Basin Planning tentative schedule developed by the Standing Committee on Comprehensive Planning of Missouri Basin Inter-Agency Committee. The development of these working papers will be a cooperative effort of representatives from seven Federal agencies and ten Missouri River Basin States.

The Office of Business Economics of the Department of Commerce is developing economic projections for the nine regions of the Missouri Basin. Using these basic data an economic study will be developed for the entire area. In development of the program, all beneficial water uses will be considered with particular emphasis in regard to conflicts for a limited resource.

CONSULTANTS:

There are a number of Federal, State, and privately employed individuals who are well informed as to the basin and its water resource problem who can be drawn upon as consultants for the project. These professional men have had a great number of years of experience in water resource development. In addition, it is anticipated that other consultants will be invited to meet with the project staff to aid in the formulation of mathematical models, computer programs, and so forth when the project is at a more advanced stage.

COMMITTEES:

Groups such as the Missouri Basin Engineering Health Council will be asked to serve as advisory committees to the study. Representatives of water users and Federal, State, Inter-State, and local agencies will be invited to serve on technical committees. These committees may be assigned tasks by regions, or by subject. Contracts have been made and assurances have been received of cooperation and assistance when needed.

ACCOMPLISHMENTS THROUGH JANUARY 1, 1965:

The Water Resources Staff of the Kansas City, Missouri Regional Office has actively participated in the work of the Standing Committee on Comprehensive Basin Planning of the Missouri Basin Inter-Agency Committee. A staff member serves both on the Standing Committee and is a member of the Committee's Executive Group. In addition, the Public Health Service is chairman of the Work Group V "Water and Related Land Resources Development." Staff members also hold membership in each of the other four Work Groups. As members of the work group, the staff members are chairmen of the task forces assigned the responsibilities for water supply, water quality and water quality control. Through these activities the staff has gained the cooperation of the other seven Federal agencies and ten Basin States who are participating in the work of the Standing Committee on Comprehensive Basin Planning.

Water Resources Section has worked closely with the Missouri Basin Inter-Agency Health Council and maintains liaison with other Federal and State agencies interested in water resources management.

DATA STORAGE AND RETRIEVAL ACTIVITIES:

As soon as the project is authorized, we hope to establish the STORET System. This method of storage and retrieval of water quality data has been discussed with some of the States of the area who have expressed an interest and have indicated that they would be willing to cooperate with us in the development of the system. Several of the States have considerable quantities of data which could be stored. We will need a uniform scale complete set of Basin maps for river mile coding. Additional detailed maps for some of the highly developed areas would be desirable if such are available.

ECONOMIC STUDIES:

While awaiting preliminary economic and demographic data and projections from the Department of Commerce (Office of Business Economics) the Economic Work Group of Missouri Basin Inter-Agency

Committee has assigned a number of duties in regards to an Economic Base Study. These data will be useful for the Missouri-Souris-Red Rivers Basins Comprehensive project.

Our limited staff has prevented us in carrying out our responsibilities in an adequate manner.

A general description of the assignment and the estimated length of time to complete them are shown below.

Part I

Economic Base Study

I. Description of the Basin
(Assignment deferred)

II. The People

  A. Characteristics of the Population
  (5 man months)

  B. Characteristics of the Labor Force
  Member of this Task Force
  (5 man months)

III. Status of Water Resource Development
(Assignment deferred)

IV. Agriculture
(No assignments)

V. The Basin's Mineral and Fuel Resources
(No assignments)

VI. Past and Present Pattern of Industrial Organization

  A. Makeup of Existing Industry and Growth

    1. Manufacturing Trends
    Member of this Task Force
    (5 man months)

    2. Industrial Production
    Chairman of this Task Force
    (8 man months)

B. Location Factors Pertinent to Economic and Population Projection
Chairman of this Task Force
(5 man months)

C. Industrial Concentration in Urban Areas or Decentralization of Industry
Member of this Task Force
(3 man months)

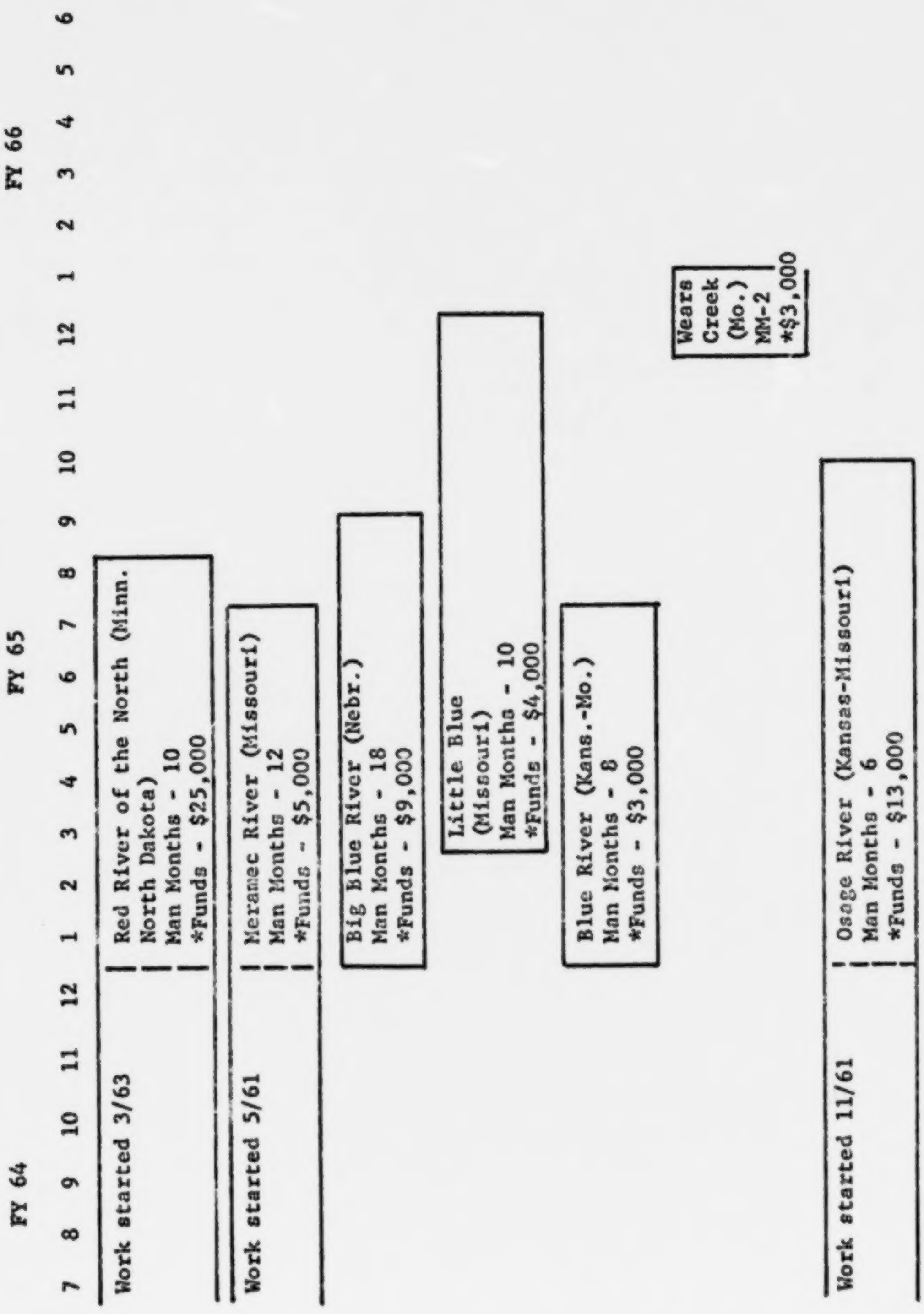
Assignments for the remainder of the outline was deferred until economic and demographic data was obtained from the Office of Business Economics, Washington, D. C.

WATER SUPPLY AND/OR POLLUTION CONTROL REPORTS:

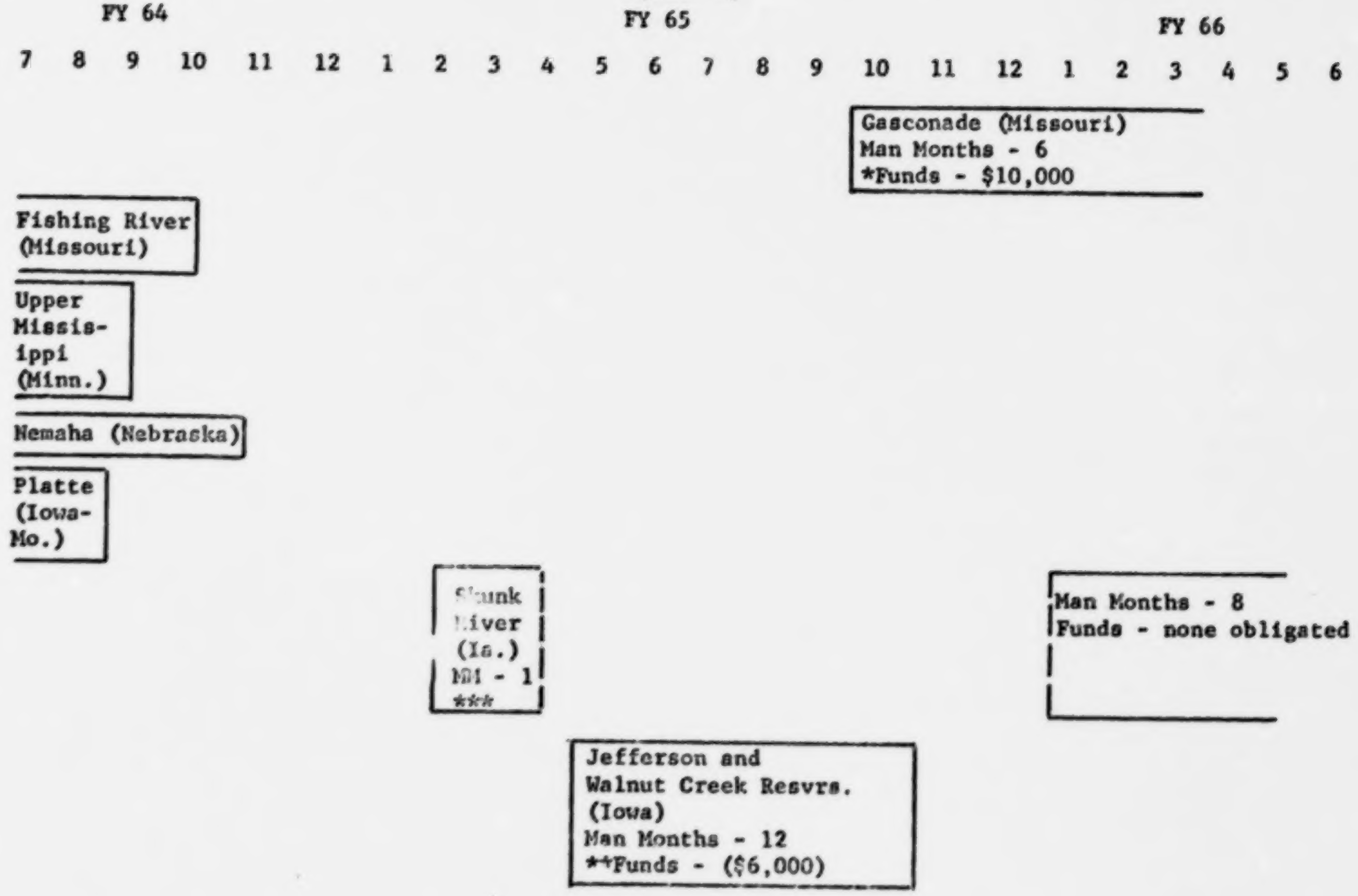
Ten reports are scheduled for completion during Fiscal Year 65. These are shown on the schedule of water resources studies. The total of reimbursable funds paid or obligated for these projects during Fiscal Year 1965 was $45,673. Our staff is not adequate to keep up with the work load and it has therefore not been possible to meet the scheduled dates of completion. We have requested authority for additional staffing.

MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

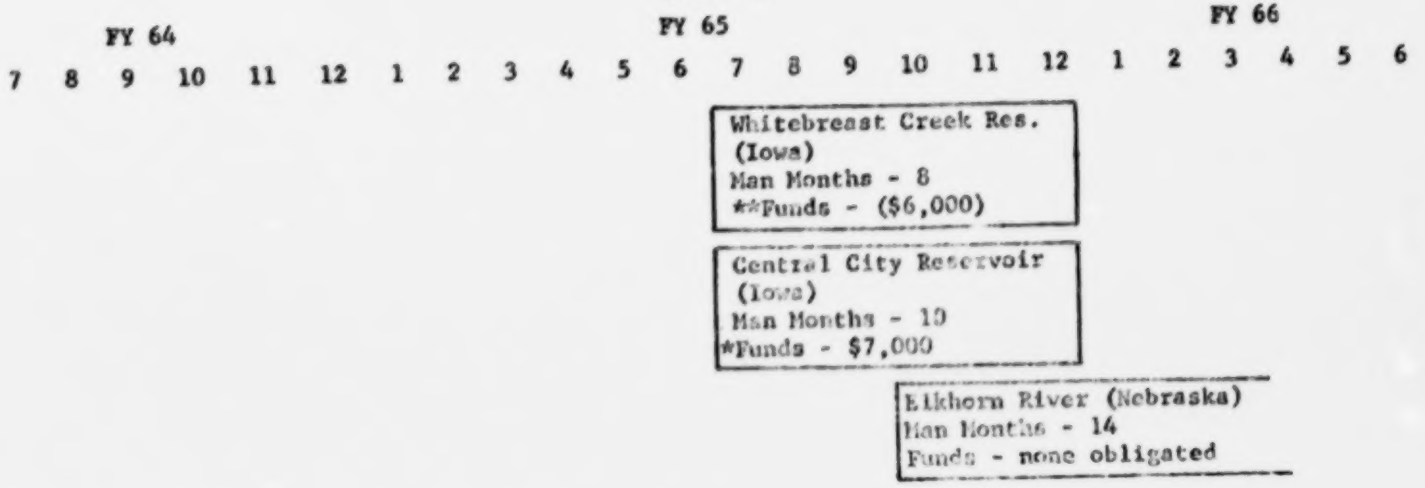
Schedule of Water Resources Studies



Schedule of Water Resources Studies
(Cont'd)



Schedule of Water Resources Studies
(Cont'd)



Whitebreast Creek Res.
(Iowa)
Man Months - 8
**Funds - ($6,000)

Central City Reservoir
(Iowa)
Man Months - 10
*Funds - $7,000

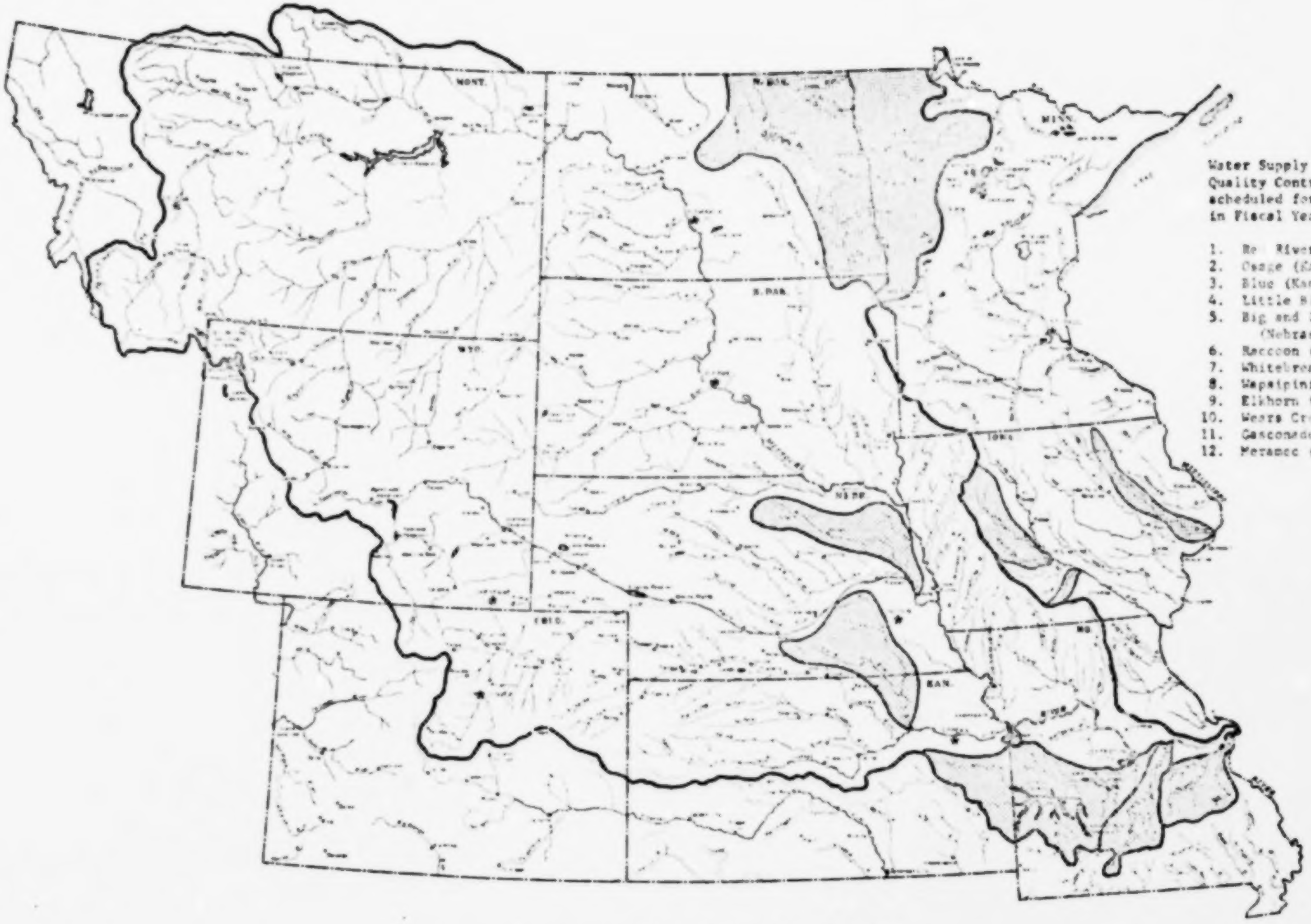
Elkhorn River (Nebraska)
Man Months - 14
Funds - none obligated

34a

Total reimbursable funds available in FY 1965 - $45,673.00
*Total reimbursable funds paid or obligated for project
**$6,000 is for the following reports: Jefferson Reservoir, Walnut Creek Reservoir, and Whitebreast Creek Reservoir (Iowa)

***Preliminary letter-type report

U.S. Department of Health, Education & Welfare
Public Health Service
Kansas City, Missouri
Region VI
January 1965



Water Supply and/or Water
Quality Control Studies
scheduled for completion
in Fiscal Year 1965.

1. Red River of the North
2. Osage (Kansas-Missouri)
3. Blue (Kansas City)
4. Little Blue (Kansas City)
5. Big and Little Blue
   (Nebraska-Kansas)
6. Raccoon (Iowa)
7. Whitebreast Creek (Iowa)
8. Wapsipinicon (Iowa)
9. Elkhorn (Nebraska)
10. Wears Creek (Missouri)
11. Gasconade (Missouri)
12. Meramec (Missouri)

MISSOURI RIVER BASIN
STATES

MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

Kansas City, Missouri   January 1965

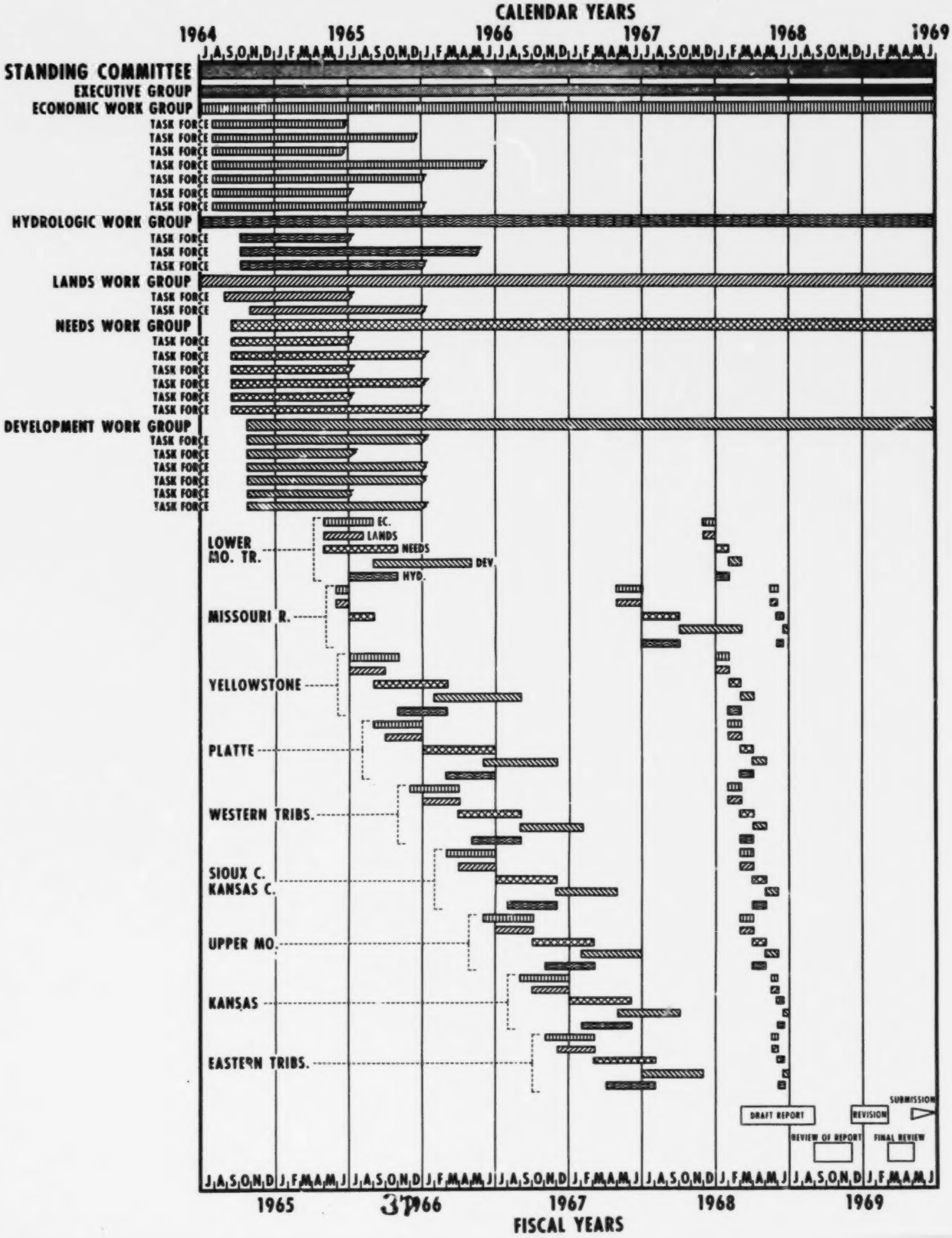
PLAN AND SCHEDULES FOR FISCAL YEAR 1966:

With establishing of Headquarters and the hiring of personnel one of the first tasks will be to develop a PERT DIAGRAM for the program. Work will start immediately on the installation of the STORET System of data storing and retrieval. This will require the development of a river mileage code for the streams of the Basin and the assembling of all available data suitable for storing in the system. Work will be continued in the development of water supply and/or pollution control reports for other Federal agencies. The staff will continue its participation in the work of the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee. A working paper for the Lower Missouri Tributaries is scheduled for completion in Fiscal Year 1966 and work is to be started on similar documents for the Yellowstone and Platte during that Fiscal Year. Much of the data required for the development of these working papers will be supplied by the other four work groups of the Standing Committee of Comprehensive Planning. These activities can be well coordinated with the over-all work plan for the comprehensive project.

MISSOURI BASIN PROJECTS PLANNED FOR THE FUTURE BUT NOT SCHEDULED

PROJECT	SPONSOR	TARGET DATE
Cache L. Poudre (Colorado)	Denver Bureau of Reclamation	1966
Julesburg (Colo.-Nebr.)	Denver Bureau of Reclamation	1968
Narrows Unit (Colorado)	Denver Bureau of Reclamation	1967
Upper South Platte (Colorado)	Denver Bureau of Reclamation	1968
St. Vrain (Colorado)	Denver Bureau of Reclamation	1966
Grayrocks (Wyoming)	Denver Bureau of Reclamation	1965
Glendo Inundated (Wyoming)	Denver Bureau of Reclamation	1965
LaPrele (Wyoming)	Denver Bureau of Reclamation	1965
Sheep Creek (Nebraska)	Denver Bureau of Reclamation	1967
West Platte (Wyoming-Nebraska)	Denver Bureau of Reclamation	1970
Ponca Creek (Nebraska)	Denver Bureau of Reclamation	1969
Mid State (Nebraska)	Denver Bureau of Reclamation	1966
Crofton (Nebraska)	Denver Bureau of Reclamation	1967
Abilene (Kansas)	Denver Bureau of Reclamation	1967
Belvue (Kansas)	Denver Bureau of Reclamation	1968
Chapman (Kansas)	Denver Bureau of Reclamation	1968
Clay Center (Kansas)	Denver Bureau of Reclamation	1970
Concordia (Kansas)	Denver Bureau of Reclamation	1970
Grantville (Kansas)	Denver Bureau of Reclamation	1968
Kipp (Kansas)	Denver Bureau of Reclamation	1967
Lawrence (Kansas)	Denver Bureau of Reclamation	1969
Menoken (Kansas)	Denver Bureau of Reclamation	1968
Oberlin (Kansas)	Denver Bureau of Reclamation	1967

COMPREHENSIVE BASIN PLANNING
TENTATIVE SCHEDULES



MISSOURI BASIN PROJECTS PLANNED FOR THE FUTURE
BUT NOT SCHEDULED
(Cont'd)

PROJECT	SPONSOR	TARGET DATE
Perry (Kansas)	Denver Bureau of Reclamation	1970
Rossville (Kansas)	Denver Bureau of Reclamation	1970
Des Moines (Iowa)	Rock Island Corps of Engineers	1967
Iowa River (Iowa)	Rock Island Corps of Engineers	1966
Cedar River (Iowa)	Rock Island Corps of Engineers	1966
Musselshell Unit (Montana)	Billings Bureau of Reclamation	1966
Marias Milk Unit (Montana)	Billings Bureau of Reclamation	1967
Mott Unit (North Dakota)	Billings Bureau of Reclamation	1967
Pollock Herreid Unit (South Dakota)	Billings Bureau of Reclamation	1967
Shoshone Extension Unit (Wyoming)	Billings Bureau of Reclamation	1967
Wagner Unit (South Dakota)	Billings Bureau of Reclamation	1965
Knife Division (North Dakota)	Billings Bureau of Reclamation	1965
Northeast Montana Division (Montana)	Billings Bureau of Reclamation	1966
Wind Division (Wyoming)	Billings Bureau of Reclamation	1965
Skunk Creek (South Dakota)	Omaha Corps of Engineers	
Cheyenne River (South Dakota-Wyoming)	Omaha Corps of Engineers	
Papillion Creek (Nebraska)	Omaha Corps of Engineers	
Salt Creek (Nebraska)	Omaha Corps of Engineers	

SUMMARY OF ACTIVITIES:

With the establishment of the project, the Public Health Service will be able to develop a program to improve, protect, and preserve the quality of surface and ground waters for all anticipated beneficial uses and meet its water pollution control responsibilities. The first year will be devoted to limited staffing, the development of a PERT DIAGRAM for operations, the installation of the STORET System of data storing and retrieval, the establishment of a river mileage code and the assembling of available data germane to the study.

We will continue to work closely with the Standing Committee of the Missouri Basin Inter-Agency Committee and will continue the development of municipal and industrial water supply and/or pollution control reports for Federal agencies.

In Fiscal Year 67 we hope to complete the river mile coding and continue work on the storing of available data. During this Fiscal Year we will begin an economic base study and analysis using data supplied by the Office of Business Economics, Department of Commerce. With an expansion of staff we will be able to begin inventories of water use and waste discharges by regions (as established by the Standing Committee for Comprehensive Basin Planning of the Missouri Basin Inter-Agency Committee). If funds are available we will establish and equip a central laboratory in Kansas City. Our cooperation will continue with the Standing Committee for Comprehensive Planning of the Missouri Basin Inter-Agency Committee and it is anticipated that working papers will be completed during Fiscal Year 67 for the Yellowstone, Platte, Western Tributaries of the Missouri, the Main Stem and

Tributaries from Sioux City to Kansas City, and the Upper Missouri Regions of the Missouri Basin. See Comprehensive Basin Planning Tentative Schedules on page 32. These working papers will include all of the basic data available regarding the present use of the water resources for all beneficial uses and will project the needs to meet future requirements. These studies will be based entirely on existing data and will be of the Type I category. They will serve as an excellent base for the planning operation of the comprehensive program. Our studies will be coordinated with the activities of the other agencies and information supplied as required to meet the time schedules of the Comprehensive Framework Plan.

The Comprehensive Water Pollution Control Study will, however, go beyond the basic needs of the framework study and will be based on as complete knowledge as is possible to acquire of present water quality conditions in the Basin, factors which will determine future water quality and alternate means of controlling water pollution to assure satisfactory water quality in the future. The study will be concerned with present and projected water requirements for domestic, municipal, industrial, and agricultural purposes and with the management of the quality of the water resources for public health, community growth, industrial and commercial development, recreation, fish, wildlife, and agriculture. Results of the study will supplement other available reports and proposed studies of the ten basin states, the Corps of Engineers, the Bureau of Reclamation, Soil Conservation Service, Federal Power Commission, Department of Commerce, Department of Labor and other Federal agencies. The program will delineate problem areas and suggest possible solutions, project population and economic growth, predict future water supply needs and related waste disposal requirements, outline water quality objectives and propose means of meeting those objectives, estimate future needs, benefits and cost of streamflow regulation and suggest research studies for projects necessary to increase knowledge in specific fields of interest. In the development of the plan, careful attention shall be given to maintaining a balance between engineering, economic, and planning aspects of the long range comprehensive water pollution control programming. The plan will be developed with full cooperation of all the Federal, State, Inter-State, municipal and private interests in the Missouri Basin.

ORGANIZATION AND MANAGEMENT

PROJECT SCHEDULE:

One of the first tasks of the Project Staff will be the development of the PERT DIAGRAM for the program. The work will be coordinated with the Missouri Basin Inter-Agency Committee Study. It is estimated the report will be completed in 1972.

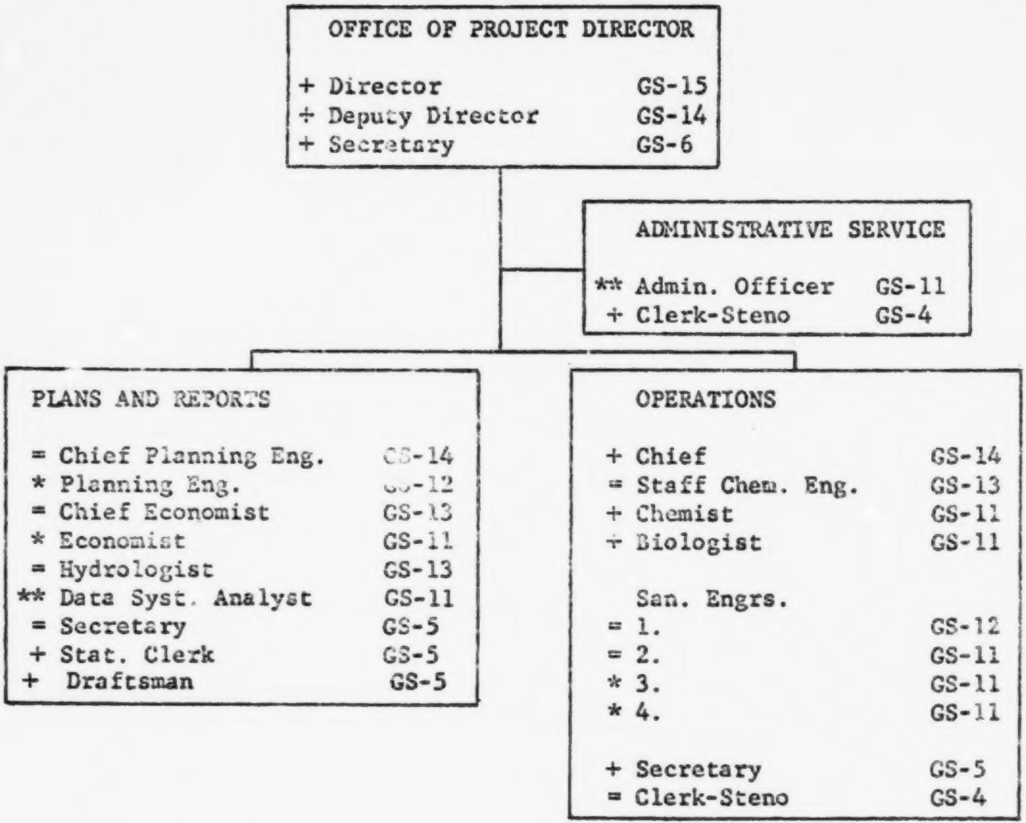
ORGANIZATIONAL CHART:

Organizational Charts have been developed for Fiscal Year 1966 recommending staffing for Fiscal Years 1965 and 1966. Also included is an Organizational Chart for the program when the staffing has been completed.

THE MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

Organizational Chart

Fiscal Year 1966
(15 additional positions)



OFFICE OF PROJECT DIRECTOR

+ Director	GS-15
+ Deputy Director	GS-14
+ Secretary	GS-6

ADMINISTRATIVE SERVICE

** Admin. Officer	GS-11
+ Clerk-Steno	GS-4

PLANS AND REPORTS

= Chief Planning Eng.	GS-14
* Planning Eng.	GS-12
= Chief Economist	GS-13
* Economist	GS-11
= Hydrologist	GS-13
** Data Syst. Analyst	GS-11
= Secretary	GS-5
+ Stat. Clerk	GS-5
+ Draftsman	GS-5

OPERATIONS

+ Chief	GS-14
= Staff Chem. Eng.	GS-13
+ Chemist	GS-11
+ Biologist	GS-11
San. Engrs.	
= 1.	GS-12
= 2.	GS-11
* 3.	GS-11
* 4.	GS-11
+ Secretary	GS-5
= Clerk-Steno	GS-4

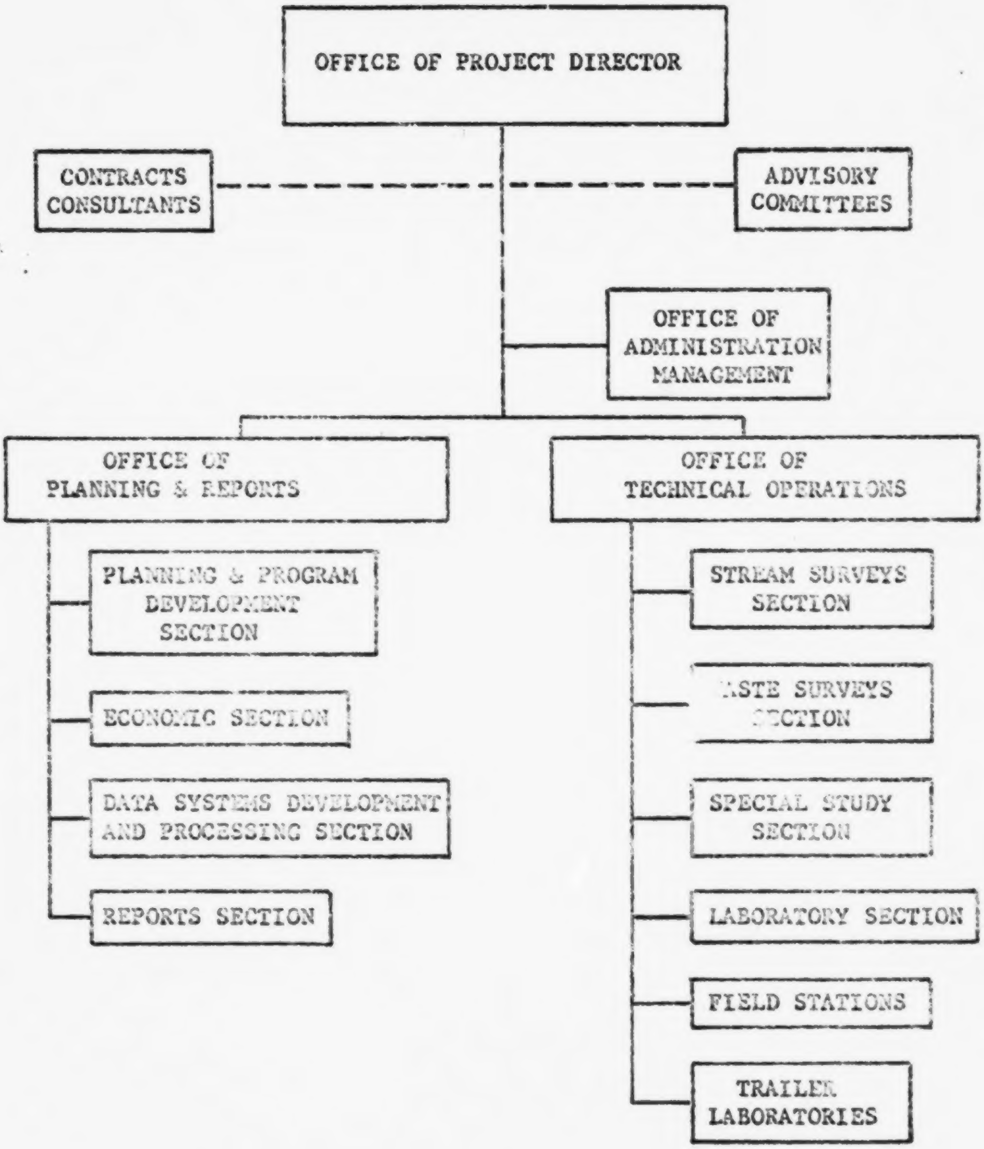
Order of Staffing

= Existing Positions FY 65
* New positions in third quarter FY 65
** New positions in fourth quarter FY 65
+ In first quarter FY 66 24 positions 20 man years

Fiscal Year 66 arrangements for staffing should be started now with assigning of personnel as soon as possible.

MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT

ORGANIZATIONAL CHART


OFFICE OF PROJECT DIRECTOR
CONTRACTS CONSULTANTS
ADVISORY COMMITTEES
OFFICE OF ADMINISTRATION MANAGEMENT
OFFICE OF PLANNING & REPORTS
OFFICE OF TECHNICAL OPERATIONS
PLANNING & PROGRAM DEVELOPMENT SECTION
ECONOMIC SECTION
DATA SYSTEMS DEVELOPMENT AND PROCESSING SECTION
REPORTS SECTION
STREAM SURVEYS SECTION
WASTE SURVEYS SECTION
SPECIAL STUDY SECTION
LABORATORY SECTION
FIELD STATIONS
TRAILER LABORATORIES

U.S. Department of Health, Education & Welfare
Public Health Service Region VI
Kansas City, Missouri January 1965

FUNCTIONAL STATEMENT:

The purpose of the project is to develop a comprehensive long range water supply and water pollution control program for the Missouri, Souris and Red Rivers Basins in accordance with Section 2 (b) of the Federal Water Pollution Control Act as amended (33 USC 466a (b)). The aim is to develop an effective water pollution control program in full cooperation with all of the Federal, State, Inter-State, municipal and private interests in the Missouri Basin. The program will include guide lines for long term water quality management based on an evaluation of: (1) existing water supply, (2) pollution control and (3) related water resources information in the project area. The project as developed will be a guide for maintaining quality of the waters in the basin and will include predictions of improvements which will be necessary to conserve the waters for all legitimate uses.

The Missouri-Souris-Red Rivers Basins Comprehensive Projects Study area includes all of the tributaries of the Missouri, the Souris, and the Red Rivers within the continental United States. The drainage area of these river systems is about one sixth of the toal area of the nation and includes parts or all of ten states.

The development of the water pollution control plan for the river basins will require a full range of comprehensive program activity, including complex engineering, chemical, biological, bacteriological, hydrological, and economic and demographic studies. The Missouri-Souris-Red Rivers Basins comprehensive program will cost approximately $5,000,000 to develop and will require 7 years for completion of the plan. The maximum number of personnel to be employed during this time will be approximately 60 and will include engineers, chemists, bacteriologists, biologists, economists, data processors, technical writers, hydrologists, and other associated competencies.

OFFICE OF PROJECT DIRECTOR:

The Office of the Project Director will direct and coordinate the activities of the numerous disciplines and interests both within and outside of the project. Interpreting Division policy in order to establish project objectives through the use of the project staff, consultants, and advisory committees, the Office of the Project Director will achieve the following:

1. Plan, organize, and direct studies to determine the present and future municipal, industrial, recreational, agricultural, and other beneficial water requirements.

2. Plan and organize and direct studies to determine the adequacy of the water resources to meet both quantity and quality requirements of all beneficial water uses listed above.

3. Plan, organize, and direct intensive field surveys to determine extent of pollution problems and the treatment requirements for control of pollutants.

4. Report project accomplishments to higher authority.

5. Represent the project in relationships with cooperating public and private entities.

PROJECT ORGANIZATION AND ACTIVITIES:

The project will be organized into two major sections: Planning and Reports, and Technical Operations. Headquarters will be in Kansas City, Missouri and will include a laboratory. Two field stations are planned and trailer laboratories will be used in making some of the field studies.

OFFICE OF PLANNING AND REPORTS:

1. Develops a PERT DIAGRAM to outline and schedule project activities so that field operations are in balance with the administrative, engineering, and laboratory capabilities of the program.

2. Time schedule - monitoring of each project function to assure timely completion.

3. Evaluates existing and "project" developed data and assembles such data for the purpose of program planning and reporting.

4. Develops and utilizes appropriate data processing, storage, and retrieval systems.

5. Plans, evaluates, and coordinates project endeavors in special areas.

6. In cooperation with other project sections and under the guidance of the project director, evaluates, reviews, and processes information and prepares project reports.

7. The Economic Section will develop an economic framework based on basic data supplied Missouri Basin Inter-Agency Committee by the Office of Business Economics, Department of Commerce.

8. The Data Systems Development and Processing Section will establish the STORET System for storing and retrieval of basic data.

OFFICE OF TECHNICAL OPERATIONS:

1. Directly responsible for the conduct of all field studies for the project with the exception of the economic studies.

2. Designs and implements field inventories, measurement, and sampling programs in all regular and special subject areas.

3. Administratively responsible for Laboratory Section, Field Stations, and operation of trailer laboratories.

4. Field study teams and temporary Field Stations will be established with responsibility to conduct the necessary water quality and special studies.

5. Responsible for inventories.

6. Laboratory Section will be responsible for all laboratory activities associated with the water quality field studies. This section will give technical assistance in analysis as well as in interpretation of water quality data.

7. The Field Stations will be responsible for planning and conducting all required field studies in their assigned areas. Field stations will also be responsible for establishing and maintaining liaison with other Federal, State, and local agencies in the conduct of field studies and implementation of the program.

OFFICE OF ADMINISTRATIVE MANAGEMENT:

1. Will advise the Project Director on the financial and administrative conduct of the project as well as handle the

necessary purchasing and personnel actions required for the conduct of the project.

2. Interpret policy and establishes administrative procedures for the operation and management of the project.

3. Procures and manages space, equipment, supplies, and services for the project.

4. Plans and manages project's fiscal affairs.

5. Provides project with personnel management.

PHS-3068
Rev. 4-64

WORKING BUDGET
Request for Funds, Fiscal Year 19 65

Program/Project No. 207/640
Region and Location VI - K.C., Mo. and Title WS & PC - Water Resources - Additional

1965 Allowance No. 5-3116	19 Actual	19 65 Request	Increase or Decrease
1. Request			
11 Personnel Compensation (Total)		14,860	
Compensation other than consultants			
Consultants' fees			
12 Personnel benefits		1,096	
21 Travel			
Change of station including dependents and dislocation allowance		1,000	
Other Travel		3,000	
22 Transportation of things			
Change of station		3,000	
Other			
23 Rents, communications & utilities (Do not include space rental)		1,000	
24 Printing and reproduction		400	
25 Other services			
Contracts (Itemize)			
Alterations - office space		2,000	
Other			

WORKING BUDGET
Request for Funds, Fiscal Year 1965 --Cont'd

Region and Location VI - K.C., Mo.
Program/Project No. 207/640
and Title WS & PC - Water Resources - Addtnl

1965 Allowance No. 5-3116	19 Actual	1965 Request	Increase or Decrease
26 Supplies and materials		400	
31 Equipment (Itemize and justify. Use separate sheet if necessary)		3,000	
Total		29,756	

Typewriter	500
Calculator	1,100
6 Desks	390
6 Swivel Chairs	300
6 Book Cases	256
12 Side Chairs	280
6 Telephone Stands	144
3 Costumers	30

Explanation of Justification for Increase

WORKING BUDGET
Request for Funds, Fiscal Year 1965 --Cont'd

Region and Location VI - K.C., Mo.

Program/Project No. 207/640
and Title WS & PC - Water Resources - Addtnl

1965 Allowance No. 5-3116

2. Requested Apportionment

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
Personnel compensation & Benefits			1,600	14,356	15,956
Travel			2,000	2,000	4,000
Contracts					
Other			9,800		9,800
Total			13,400	16,356	29,756

Justification for Unequal Apportionment

PCS-HHE for 6 persons, alterations - office space, telephone
installation charges and equipment in 3rd qtr.
PCS-HHE for 2 persons in 3rd qtr.

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-4-

Personnel on Duty as of April 1, 19__ (Current Year)
and
Personal Services Request for FY 1965 (Budget Year)

Program/Project No.
and Title WS & PC - Water Resources - Addtnl

Region and Location VI - K.C., Mo.

19 65 Allowance No. 5-3116

Position Title	Encumbent (as of 4/1/)	Grade 1/	Current Annual Rate	1965 Request Compensation	1965 Request Benefits	Remarks 2/
New Positions						
Engineer GS-11/1				2,895	225	EOD 3/1/65
Engineer GS-11/1				2,895	225	EOD 3/1/65
Engineer (Planning) GS-12/1				2,569	199	EOD 4/1/65
Economist GS-11/1				2,167	149	EOD 4/1/65
Administrative Officer GS-11/1				2,167	149	EOD 4/1/65
Data Systems Analyst GS-11/1				2,167	149	EOD 4/1/65
				14,860	1,096	

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WORKING BUDGET
Request for Funds, Fiscal Year 19 66

Region and Location VI - K.C., Mo.

Program/Project No. 207/640
and Title WS & PC - Missouri River Comprehensive

19 65 Allowance No. 5-3116

	19__ Actual	19 66 Request	Increase or Decrease
1. Request			
11 Personnel Compensation (Total)			
Compensation other than consultants		157,774	
Consultants' fees			
12 Personnel benefits		13,511	
21 Travel			
* Change of station including dependents and dislocation allowance			
Other Travel		55,000	
22 Transportation of things			
Change of station			
Other			
23 Rents, communications & utilities (Do not include space rental)		4,400	
24 Printing and reproduction		2,800	
25 Other services			
Contracts (Itemize)			
Alterations - office space		2,000	
Other			

WORKING BUDGET
Request for Funds, Fiscal Year 1966 --Cont'd

Region and Location VI - K.C., Mo.

Program/Project No. 207/640
and Title WS&PC-Missouri River Comprehensive

1965 Allowance No. 5-3116	19 Actual	1966 Request	Increase or Decrease
26 Supplies and materials		1,600	
31 Equipment (Itemize and justify. Use separate sheet if necessary)		10,000	

3 Typewriters	1500
1 Calculator	1100
Dictating Equipment	1235
3 Typist Desks	240
3 Typist Chairs	75
Misc. Typist Equipment	50
Equip. for 9 Consultant offices	5800

	19 Actual	1966 Request	Increase or Decrease
Total		247,085	

Explanation of Justification for Increase

WORKING BUDGET
Request for Funds, Fiscal Year 1966 --Cont'd

Region and Location VI - K.C., Mo.

Program/Project No. 207/640
and Title WS&PC-Missouri River Comprehensive

19 65 Allowance No. 5-3116

2. Requested Apportionment

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Total
Personnel compensation & Benefits	42,967	43,327	42,164	42,827	171,285
Travel	13,750	13,750	13,750	13,750	55,000
Contracts					
Other	12,700	2,700	2,700	2,700	20,800
Total	69,417	59,777	58,614	59,277	247,085

Justification for Unequal Apportionment

Equipment to be purchased in 1st quarter to set up office for 9 additional people.

PHS-3068
Rev. 4-64

Personnel on Duty as of January 1, 1965 (Current Year)
and
Personal Services Request for FY 1966 (Budget Year)

Program/Project No. 207/640
and Title WS&PC - Missouri River Comprehensive

Region and Location VI - K.C., Mo.

1965 Allowance No. 5-3116

Position Title	Encumbent (as of 1/1/65)	Grade 1/	Current Annual Rate	19__ Request Compensation	19__ Request Benefits	Remarks 2/
Authorized 19 positions:						
Supervisory San. Engineer	Young, Lewis A.	GS-14/8	17,600	14,219	1,055	Incumbent to Project Director 7/1/65. Position figured on basis of GS-14/1 7/1/65
Chief Economist	Hajinian, C. H.	GS-13/2	12,495	12,967	967	PSI to GS-13/3 due 7/18/65
Staff Engineer (Chem.)	Wicks, A. T.	GS-13/3	12,915	13,696	1,017	PSI to GS-13/4 due 10/1/65
Engineer	Witherow, J. L.	Full(+8)	9,512	10,294	787	Tsfr.pendng.Position fig. on GS-12/1 for FY 1966
~~[illegible]~~ Engineer	Reid, Billy H.	Asst.(-2)	5,391	8,686	676	Tsfr pendng.Position fig. on GS-11/1 for FY 1966
Hydrologist	Draper, Donald C.	Full(+8)	9,512	7,241	2,489	+ 10 yrs. 5/28/66
Secretary	Collier, Linda R.	GS-5/2	5,165	5,011	424	Incumbent to Project Director's Sec.7/1/65. Pos.fig.on GS-5/1 for FY66.
~~[illegible]~~:						
Clerk-Steno.	Thorpe, Carolyn M.	GS-4/1	4,480	4,656	401	Pos.fig.on GS-4/2 for FY66.
Clerk-Steno.	Robinson, Betty J.	GS-4/1	4,480	4,656	401	Pos.fig.on GS-4/2 for FY66.
~~[illegible]~~						

1/ for commissioned officers indicate years of service (i.e. +4,+6, etc.) as well as grade.

2/ Indicate what causes the request to be other than a normal full year projection of the position. Note such things as change in program assignment at beginning of fiscal year; accession, separation, reassignment, or transfer dates; dates of intra-program transfers between projects; etc.

PHS-3068
Rev. 4-64

-5-

January 1, 1965
Personnel on Duty as of ~~Apxxxxxxx0~~ (Current Year)
and
Personal Services Request for FY 19 66 (Budget Year)

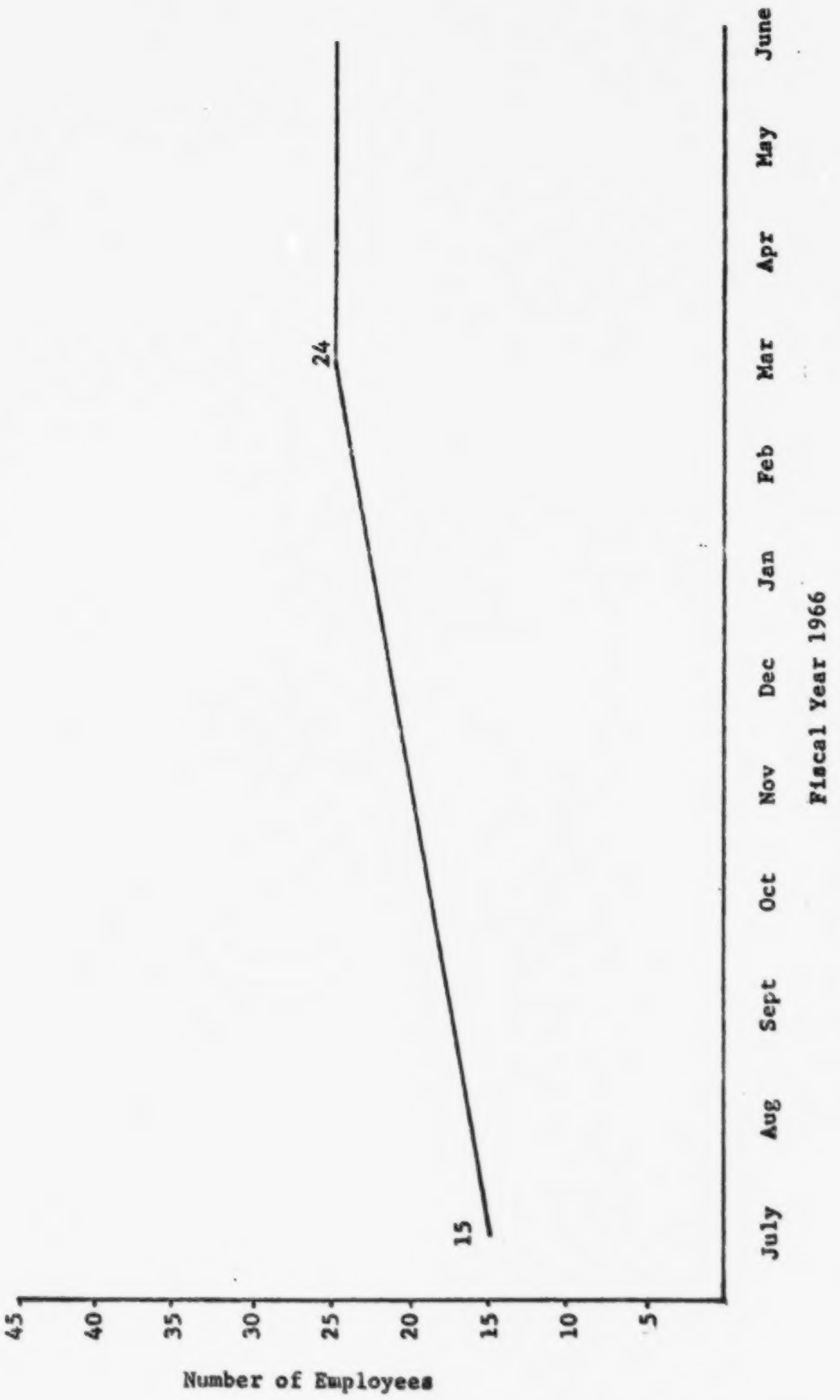
Region and Location VI - K.C., Mo.

1965 Allowance No. 5-3116

Program/Project No. 207/640
and Title WS&PC-Missouri River Comprehensive

Position Title	Encumbent (as of 4/1/)	Grade 1/	Current Annual Rate	1966 Request Compensation	1966 Request Benefits	Remarks 2/
New Positions FY 1965						
Economist		GS-11/1	8,650	8,905	690.	To GS-11/2 4-1-66
Planning Engineer		GS-12/1	10,250	10,559	804.	To GS-12/2 4-1-66
Engineer		GS-11/1	8,650	8,905	690.	To GS-11/2 3-1-66
Engineer		GS-11/1	8,650	8,905	690.	To GS-11/2 3-1-66
Administrative Officer		GS-11/1	8,650	8,831	685.	To GS-11/2 4-1-66
Data Systems Analyst		GS-13/1	12,075	12,443	946.	To GS-13/2 4-1-66
New Positions 7-1-65						
Project Director	(Young, L.A.)	GS-15/6	19,310	19,377	1,406.	
Deputy Project Director		GS-14/1	14,170	14,219	1,055.	
Secretary	(Collier, L.R.)	GS-6/2	5,690	5,721	473.	
Clerk-Steno (Admin. Services)		GS-4/1	4,480	4,489	390.	
Statistical Clerk		GS-5/1	5,000	5,011	424.	
Chief, Operations Section		GS-14/1	14,170	14,219	1,055.	
Biologist		GS-11/1	8,650	8,686	676.	
Chemist		GS-11/1	8,650	8,686	676.	
Secretary (Operations Section)		GS-5/1	5,000	5,011	424.	
				$225,393	$19,301	
			less 30% lapse	67,619	5,790	
Subtotal (FY 1966 Cost of New Positions)				$157,774	$13,511	

PROJECTED MONTHLY EMPLOYMENT



MISSOURI-SOURIS-RED RIVERS BASINS COMPREHENSIVE PROJECT
Headquarters Staffing Requirements FY 66-67

Permanent Positions 1966 - 24 1967 - 40

UNIT AND POSITION TITLE	GRADE	NAME*	STAFFING DATE
OFFICE OF PROJECT DIRECTOR			
Project Director	GS-15	Young	7-65
Deputy Project Director	GS-14		7-65
Secretary	GS-6	Collier	7-65
ADMINISTRATIVE SERVICES			
Administrative Officer	GS-11		4-65
Clerk-Stenographer	GS-4		7-65
PLANS AND REPORTS			
Chief Planning Engineer	GS-14		7-65
Chief Economist	GS-13	Hajinian	7-65
Economist	GS-11		4-65
Planning Engineer	GS-12		4-65
Hydrologist	GS-13	Draper	7-65
Draftsman	GS-5		7-65
Data Systems Analyst	GS-11		4-65
Secretary	GS-5		7-65
Clerk-Stenographer	GS-4	Thorpe	7-65
Clerk-Stenographer	GS-3		7-65
Statistical Clerk	GS-5		7-65
Librarian	GS-5		7-66
OPERATIONS			
Chief, Operations Section	GS-14		7-65
Staff Engineer	GS-12	Witherow	7-65
Field Engineer	GS-11	Reid	7-65
Field Engineer	GS-11		7-66
Engineer Aid (6)	GS-5		7-66
Secretary	GS-5		7-65
Stream and Special Studies			
Chemical Engineer	GS-13	Wicks	7-65
Field Engineer (2)	GS-11		3-65
Biologist	GS-11		7-66
Aquatic Sample Collector (8)	GS-4		7-66
Clerk-Stenographer	GS-4	Robinson	7-65
Laboratory Services			
Director	GS-13		7-66
Chemist	GS-11		7-65
Chemist	GS-11		7-66
Laboratory Helper	GS-3		7-66

*Present Water Resources staff of Water Supply and Pollution Control Program, Kansas City Regional Office January 1965

Tables on budgets, analysis of activities by name of project, analysis of external expenses, table of personnel, personnel summary for FY 64, 65, 66 and analysis of 1965 vacancies are not included. Neither is the table on equipment and supplies available for transfer, nor analysis of existing project space.

In regard to space, the Water Resources Section of the Regional Office now utilizes approximately 1600 square feet of floor space in the Department of Health, Education & Welfare's Building at 560 Westport Road. With authorization of the project and successful staffing during Fiscal Year 1966, our space requirements for that year will increase to approximately 5000 square feet. It is hoped that we will be able to establish a central laboratory in FY 67. With the additional anticipated increases in staff and the establishment of a laboratory, our Headquarters space requirements for FY 67 will be approximately 10,000 square feet. Some additional space will be required in Headquarters for Fiscal Years 1968-69-70 and 71. The plan calls for establishment of a field office in FY 68 and a second field office in FY 69. Space will be required for each field office starting in those years.

This information is provided in lieu of table for the analysis of existing and projected space for FY 65-66-67.

APPENDIX

Draft
October 30, 1964

MBEHC

RESOLUTION ON COMPREHENSIVE WATER POLLUTION CONTROL STUDY FOR MISSOURI - SOURIS - RED RIVER BASINS

WHEREAS the Missouri Basin Engineering Health Council, which is made up of the State Sanitary Engineers of the ten States in the Missouri River Basin, recognizes the direct responsibility of its members in the health aspects of water supply and

WHEREAS most of them have similar responsibility in the control of water pollution and

WHEREAS the members recognize the importance of the establishment of comprehensive programs for development of water and related land resources and

WHEREAS the Council is aware of action being taken by the Missouri Basin Inter-Agency Committee in expanding the general purposes, scope, and objectives of the preparation of the comprehensive study of the development of water and related land resources plan for the Missouri River Basin and

WHEREAS the Council members are especially cognizant of the importance of a comprehensive water pollution control study as a vital part of the over-all program and

WHEREAS the Council members have knowledge of established procedures and relations with the U. S. Public Health Service in such matters and are fully aware of the role that the States must play in the successful execution of the proposed study; now therefore, be it

RESOLVED that the Missouri Basin Engineering Health Council endorses and supports the establishment by the U. S. Public Health Service of a Missouri and Souris-Red Rivers Basins Comprehensive Water Pollution Control Study and supports the appropriation of funds for this purpose.

ARCHIE GUBBRUD
GOVERNOR

SOUTH DAKOTA
OFFICE OF THE GOVERNOR
PIERRE

JOHN TREVILLYAN
EXECUTIVE AIDE

RESOLUTION

MISSOURI RIVER STATES COMMITTEE

December 4, 1964

WHEREAS, Congress has authorized the establishment of Regional Water Pollution Laboratories to implement more fully the development of the nation's water resources; and

WHEREAS, Laboratories have been established at Ann Arbor, Michigan; Corvallis, Oregon; Athens, Georgia; Alaska; Boston, Massachusetts; and Ada, Oklahoma, to serve this interest; and

WHEREAS, Consideration has been given in the 88th Congress to establish a facility for the Missouri-Mississippi Basin; and

WHEREAS, There is a need for the Missouri River States to consider the needs for a separate facility to service adequately the Missouri Basin area;

NOW THEREFORE BE IT RESOLVED, That the Missouri River States Committee endorse the establishment of a separate laboratory to serve the Missouri Basin; and

BE IT FURTHER RESOLVED: That the Missouri River States Committee through the Governor of each basin state, designate a member to serve on a committee to consider the needs and possible programs of a laboratory facility that can adequately serve the Missouri Basin; and

BE IT FURTHER RESOLVED: That the committee submit its report and recommendations to the States Committee by February 1, 1965.

APPENDIX C

STANDING COMMITTEE
ON
COMPREHENSIVE BASIN PLANNING
MISSOURI BASIN INTER-AGENCY COMMITTEE
P. O. BOX 1216
DOWNTOWN STATION
OMAHA, NEBRASKA 68101

CHARLES A. COCKS, CHAIRMAN
J. W. GRIMES, VICE CHAIRMAN

COMMITTEE MEMBERS

FEDERAL MRDIA

CHARLES A. COCKS
CORPS OF ENGINEERS

C. DALE JAEDICKE
DEPARTMENT OF AGRICULTURE

VERNE ALEXANDER
DEPARTMENT OF COMMERCE

LEWIS A. YOUNG
DEPARTMENT OF HEALTH, EDUCATION
& WELFARE

BRUCE JOHNSON
DEPARTMENT OF INTERIOR

KENNETH M. KINGSBURY
DEPARTMENT OF LABOR

KENNETH G. TOWER
FEDERAL POWER COMMISSION

STATE

STANLEY A. MILLER
COLORADO

N. GARLAND HERSHEY
IOWA

JOHN M. DEWEY
KANSAS

DALE H. CHAPMAN
MINNESOTA

CLIFFORD L. SUMMERS
MISSOURI

WILSON WHITE
MONTANA

DAN S. JONES, JR.
NEBRASKA

MILO W. HOISVEEN
NORTH DAKOTA

J. W. GRIMES
SOUTH DAKOTA

GEORGE L. CHRISTOPULOS
WYOMING

31 August 1964

Mr. Henry P. Caulfield, Jr.
Resources Program Staff
Department of the Interior
Washington, D. C.

Brig. Gen. Howard W. Penney
Office, Chief of Engineers
Department of the Army
Washington, D. C.

Mr. James J Flannery
Public Health Service, Rm 3317
Department of Health,
Education & Welfare
Washington, D. C.

Mr. Hollis R. Williams
Soil Conservation Service
Department of Agriculture
Washington, D. C.

Gentlemen:

Reference is made to procedures established by the Interdepartmental Staff Committee, ad hoc Water Resources Council, dated 9 July 1964, for the coordination of budget requests for Fiscal Year 1966.

The Federal Agency Representatives of the Standing Committee on Comprehensive Basin Planning met in Omaha and assembled and reviewed the data required by the above referenced instructions. Inclosed are copies of the booklet which was prepared covering the coordinated budget requests for Fiscal Year 1966 for the Comprehensive Framework Study of the Missouri Basin.

In establishing guidelines for framework studies the Interdepartmental Staff Committee, ad hoc Water Resources Council, recognized the basic responsibilities of the Public Health Service in the development of a comprehensive water quality and pollution control program for the Missouri River Basin. It had been assumed that the intensive phase of the Public Health Service Comprehensive Planning Program for the Missouri River Basin would be going on concurrently with, and could be coordinated with, the cooperative framework study.

31 August 1964

An amount of $430,000 was included in the Coordinated Comprehensive River Basin Planning estimates as the cost of providing the other agencies with water supply and water quality data. Neither funding nor staff has been authorized for the development of the Public Health Service part of the cooperative study. Therefore, the effectiveness of the Public Health Service as a participating agency in the Missouri Basin Inter-Agency Comprehensive Framework Study has been adversely affected. In fact, if work on these phases is not started soon, it may delay the entire study.

It will be noted in the attached booklet that for Fiscal Year 1965 no funds are shown for the Department of Commerce - Weather Bureau, for participation in the Comprehensive Framework Study of the Missouri River Basin. It was the consensus of the Federal Representatives meeting on the coordinated budget that it was unfortunate that funds were not made available for Fiscal Year 1965 so that the Weather Bureau could proceed with the climatic and hydro-climatic analysis for incorporation in the study. The Department of Commerce representative indicated he was unsure that budget amounts would be included for Fiscal Year 1966 and thereafter. It would be appreciated if the Interdepartmental Staff Committee could contact the Department of Commerce and encourage their interest in participation in the Comprehensive Framework Study of the Missouri Basin.

Sincerely yours,

Charles A Cocks
CHARLES A. COCKS
Chairman, Standing Committee on
Comprehensive Basin Planning,
MBIAC

Incl: (in trip)
Coord Budget FY 66

cc:
W. E. Hiatt, WB, Washington
H. F. Mosbaugh - 70 cys
L. A. Young - 10 cys
K. G. Tower - 10 cys
C. D. Jaedicke - 10 cys
Verne Alexander - 10 cys
K. M. Kingsbury - 10 cys

FOR OFFICIAL USE ONLY

FOR OFFICIAL USE ONLY

MISSOURI RIVER BASIN

COMPREHENSIVE FRAMEWORK STUDY

Coordinated Budget Estimates assembled by Federal representatives of the Standing Committee on Comprehensive Basin Planning of Missouri Basin Inter-Agency Committee, consisting of:

Charles A. Cocks	Corps of Engineers
Harrell F. Mosbaugh	Department of Interior
C. Dale Jaedicke	Department of Agriculture
Lewis A. Young	Department of Health, Education & Welfare
Kenneth G. Tower	Federal Power Commission
Verne Alexander	Department of Commerce
Kenneth M. Kingsbury	Department of Labor

September 1, 1964
Omaha, Nebraska

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MISSOURI RIVER BASIN
COMPREHENSIVE FRAMEWORK STUDY

HISTORY AND COORDINATION

The Missouri Basin Inter-Agency Committee at its February 1963 meeting took action to consider a proposal made at its December 1962 meeting that the Committee sponsor a joint Federal and State comprehensive study of the Missouri Basin. A Subcommittee was formed, consisting of one member from each of the seven Federal Agencies and the ten States represented on the Committee to explore the general possibilities, scope, and objectives of making a comprehensive study of development of a water and related land resource plan for the Missouri Basin. This action was taken in light of (a) the Senate Select Committee's Report which indicated potential water shortages in the Missouri Basin in the future; (b) the consideration being given to the basin-wide planning on the national level; and (c) to the realization that in the twenty years since broad basin-wide studies had been undertaken in the Missouri Basin changes had occurred in the economic conditions and Federal and State policies related to water resource and related land resource development.

The Subcommittee reported favorably toward undertaking the joint study, recommended that the study be of a framework nature, and suggested a brief definition of the scope of the study in June 1963. The main Committee requested the Subcommittee to continue its work and prepare a detailed outline, cost estimate and general schedule of accomplishing the study. Subsequent to the Subcommittee's report the Missouri Basin Inter-Agency Committee adopted at its June 1964 meeting the outline of work on the study and established a Standing Committee to carry on the coordination of work of the Federal Agencies and the States in accomplishing the Comprehensive Framework Study of water and related land resource development of the Missouri Basin.

Thus there has been close coordination in the planning of the framework study of the Missouri Basin by the Federal Agencies and the States from the very inception. Work has been initiated on the study under the outline of work with full coordination between the Federal Agencies and the States.

September 1, 1964

SUMMARY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Agencies Involved and Total to be Budgeted

Agency	Total Amount	FY 65	FY 66
Department of Agriculture			
Soil Conservation Service	$ 900,000	$125,000	$ 205,000
Forest Service	200,000	35,000	46,000
Economic Research Service	400,000	50,000	90,000
Department of the Army			
Corps of Engineers	1,779,000	250,000	400,000
Department of Health, Education & Welfare			
Public Health Service	430,000	0	100,000
Department of the Interior			
Geological Survey	85,000	T 15,000	35,000
Bureau of Indian Affairs	27,000	T 7,000	10,000
Bureau of Land Management	45,000	T 5,000	35,000
Bureau of Mines	60,000	T 30,000	20,000
Bureau of Outdoor Recreation	73,000	T 18,000	19,000
Bureau of Reclamation	1,500,000	253,500	379,000
Fish & Wildlife Service	60,000	T 15,000	15,000
Federal Power Commission	80,000	16,000	16,000
Department of Commerce	118,500	0	32,000
Department of Labor	95,500	20,000	20,000
TOTALS	$5,853,000	$839,500	$1,422,000

Note: "T" Indicates transfer of funds.

2. Brief Description of Basin

The longest river in the United States, the Missouri River, flows 2,315 miles from Three Forks, Montana, to its mouth, where it joins the Mississippi River a few miles above Saint Louis, Missouri. It drains an area of 529,000 square miles of the United States and Canada, of which about 9,700 square miles lie north of the international boundary. The area in the United States is about one-seventh of the total area of the nation and includes part or all of ten states. By far the greater part of the area is comprised of rolling or gently sloping plains and prairies, bordered on the west by the Rocky Mountains, with the Ozark Highlands to the South. Within the plains area, the Black Hills of South Dakota are the principal topographic feature.

The Missouri River, with its tributaries, rises at elevations of 14,000 feet and empties into the Mississippi River at elevation of 400 feet. The maximum, average, and minimum flows at the mouth are about 900,000; 83,000; and 4,000 cubic feet per second, respectively. The Missouri River has 30 major tributaries, varying in length from 100 to 1,000 miles, and draining areas varying in size from 2,400 square miles to 90,000 square miles.

The area has widely divergent climatic characteristics. Average annual rainfall ranges from about 6 inches for a limited area in the northwestern plains to 44 inches in the lower basin. Seasonal rainfall over most of the basin is highly variable, and the annual rainfall can vary from less than one-half normal to several times the normal rainfall. There is also a wide range in temperatures, from -60° to 120° F, with below zero to over 100 degrees being experienced over much of the basin.

The basin has approximately 113 million acres in cropland, 175 million in grassland, 45 million in forest and woodland, and 7 million acres in other uses, totaling 340 million acres. Nearly two-thirds of the western plains is in grass, while in the lower basin and eastern plains nearly one-half of the land is used for crops. Forests and woodlands are important in the Rocky Mountains, Black Hills, and Ozark Highlands. About 4-1/2 million acres, or 1-1/2 percent, of the farmlands are irrigated, 7 percent of the approximately 550,000 farms report some irrigation. The basin contains approximately 25 percent of the farmland of the nation. It produces more than one-third of the nation's wheat and sugar beets, nearly one-half of the rye and flaxseed, and includes between one-fourth and one-third of the nation's acreage of corn, oats and barley. Sales of livestock and wool amount to over one-fourth of the nation's total.

Agricultural enterprises, including processing of agricultural products, are the principal business and provide jobs for about one-third of the employed persons within the region. A major economic contribution in several basin states is made by business in connection with tourists attracted by the recreation and wildlife resources.

In 1962 the ten Basin States produced 47 different mineral commodities valued at $2,371 millions which is indicative of current development and the potential. Total population (1960) is about 7-1/2 million, of which more than three-fifths live in urban areas. Population density is much higher in the eastern portion with most of the large cities located along the major streams. The farm population varies from over ten people per square mile in the eastern portion of the basin to less than two per square mile in the northwestern half of the basin. In recent years there has been a trend of people moving from rural to urban areas. On an overall basis the population of the basin has not kept up with the national rate of increase, indicating emigration of the basin's residents. This has caused concern because indications are that it is the younger generation which is leaving.

3. Present Development

The area comprising the Missouri Basin, among other areas, was purchased by the United States in 1803 as the Louisiana Purchase. Lewis and Clark navigated the Missouri on their exploratory expedition of the territory and to the west coast in 1804-1806. The first steamboat entered the Missouri River in 1819 and traffic developed rapidly. Navigation hazards became so great and sinkings so frequent, however, that in 1838 the Corps of Engineers was authorized by Congress to remove snags from the channel and improve landings at important river ports.

In the early years Corps of Engineer activities on the Missouri River were primarily in connection with navigation. Local people, however, did provide some measure of flood protection at key points. Agricultural development of the basin was accelerated by the Homestead Act of 1862, the construction of railroads in the late 1800's, and the establishment of land grant colleges and agricultural experiment stations. Early irrigation, starting in the 1860's was carried on by individuals and private companies.

Shortly after the Reclamation Service was established in 1902, investigation and, subsequently, construction of Federal irrigation projects were started. Some of these are the Huntley Project, North Platte Project, and Shoshone Project, each started in 1905, the Milk River Project in 1907, the Riverton Project in 1920, and the Kendrick Project in 1936.

The creation of Department of Agriculture agencies in the early 1900's further focused attention on the development, use, management,and conservation of land and water resources of the basin. One of the early projects, authorized in 1912, was for bank stabilization and navigation from Kansas City to the mouth which was extended upstream to Sioux City in 1928. All the early developments were on an individual project basis.

The initial comprehensive investigation of water resources and use thereof was undertaken in the late 1920's and early 1930's. Although the investigation and reports covered the entire basin and considered the functional uses then considered primary, only a few individual projects were authorized for construction. One of these, the Fort Peck Dam and Reservoir, was undertaken in 1933 as a public works project. In 1936 Congress expressed the policy that control of floods was in the national interest and authorized construction of several local protection projects. One of the more extensive projects was at the Kansas Citys, Missouri and Kansas. Subsequently, Congress and Congressional committees authorized and directed studies to be undertaken of portions of the basin. Many were specifically to review the 308 Reports of a given area and all studies started out from the basis of the findings in the 308 Reports.

In 1943 and 1944 both the Corps of Engineers and the Bureau of Reclamation prepared reports containing proposals for widespread development of the water resources of the Missouri River Basin. Both agencies drew

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largely on earlier work, the Corps particularly on the 308 reports and investigations made subsequently, the Bureau on individual project studies as well as basin-wide investigations. These reports were coordinated and approved by the Congress in the Flood Control Act of 1944. The portion of the development to be constructed by the Corps was a modification and expansion of the general comprehensive plan for the Missouri Basin approved by the Congress in the 1938 Flood Control Act. The portion to be prosecuted by the Secretary of the Interior through the Bureau of Reclamation constituted a separate entity known as the Missouri River Basin Project.

The Missouri River States Committee was started in 1942 and was one of the principal local agencies influential in supporting the proposals culminating in the 1944 authorization. It has continued in existence assisting in activities associated with development of the water and land resources of the basin. In 1945, shortly after adoption of the comprehensive plan for the Missouri Basin the Missouri Basin Inter-Agency Committee was formed to coordinate the activities of the Federal Agencies concerned with water and related land resource development and the ten states in which the basin is located. This Committee has been very active in assuring cooperation among the Federal and State Agencies.

Since that time steady progress has been made. The most notable progress has been made in the field of Federal hydroelectric power with expansion of installed capacity from about 100,000 kw in early 1944 to 2,052,000 kw at the present, with an additional 668,000 kw under construction. Reservoir storage for flood control has reduced flooding on nearly 2-1/2 million acres, some to a high degree, some only partially. Levees, with appurtenant works provide a high degree of protection to 320,000 acres of which about 22 percent is high value municipal and industrial area.

In addition to irrigation of 1,556,000 acres under the older Reclamation Projects distribution works have been constructed to serve nearly 300,000 acres under the Missouri Basin Project authorized in 1944. The lower 600 miles of the Missouri River have been improved for navigation and, although project depth has not been accomplished, 2,250,000 tons of commercial traffic used the waterway last year. Approximately 23 watersheds have been essentially completed and work is underway on 44 additional ones.

The passage of Federal water pollution control legislation initiated a national program for the protection of stream water quality and assistance in construction of sewage treatment works. Significant progress has been accomplished in the initiation of plans for treating municipal sewage at many localities, looking forward to abatement of pollution of many basin streams, including the Missouri River itself.

Given below is a brief tabulation showing some of the principal Federal features which have been placed in operation or are under construction. These features are shown on the attached map on which status is shown.

Item	In Operation	Under Construction
Reservoirs - No.	57	8
Reservoir Capacity - Acre-feet	91,363,320	7,968,700
Hydro Power Plants - No.	23	2
Installed Capacity - kw	2,052,000	718,000
Transmission Lines - Miles	8,862	1,182
Watershed Projects - No.	27	51
Area Included in Watershed Plan - Acres	784,345	4,840,003
Watershed Res. Approx. Capacity - Ac-ft	69,557	250,089
Channel Improvement for Navigation - Mi.	616	117
Local Flood Protection Projects - No.	37	10
Area Protected by Local Flood Protection Projects - Acres	69,200	
Irrigated Area - Acres	1,842,000	188,000
Area Receiving Flood Protection - Acres	3,000,000	

4. Future Needs

The stabilization and enhancement of the economy is the principal goal of the major facets of the development program. Since land and water are among the greatest natural resources of the Missouri River Basin the greatest problems of the basin are those directly associated with the use of land and control of water. The economy of the region is largely dependent upon agriculture, and the fluctuations because of drought, floods, and many other factors, many of which are beyond the control of farmers, seriously disrupt the economy. Control of floods, land and watershed treatment, and irrigation are all beneficial in assisting to stabilize agricultural production. Encouraging industrialization will materially assist in broadening the economic base of the region.

Floods have ravaged the basin as far back as records extend, even when natural forests and grasses covered the land. Floods may be caused by snowmelt, a general rain, a combination of both, or by cloudbursts. Such floods have destroyed lives, homes, industries, farm crops and livestock. They have also disrupted commerce and retarded development of the flood plains.

Almost every part of the basin experiences occasional crop failure from drought and some parts experience frequent failures. A few droughts are widespread and prolonged, reducing ground cover and allowing wind erosion and producing critical water shortages. The drought of the 30's because of its length of about 10 years and the fact that its influence was felt in all parts of the basin, is an outstanding example. Many communities dependent upon streamflow for municipal water purposes are seriously affected when flows in the streams are reduced by drought or quality is impaired by municipal and industrial waste pollution, mineralization and sediment. The quality of water limits its usefulness.

Attraction and stimulation of industries have lagged for many reasons such as dependence upon agriculture which is affected by the vagaries of the climate, because of the high cost of transportation of commodities to distant market areas, and also because of the lack of dependable municipal and industrial water supply in some areas.

Recent years have seen a marked growth in the use of electricity for farms, homes, industries, rural electrification, air conditioning, and irrigation pumping. Power production and use have experienced rapid expansion but forecasts indicate that the rate of growth of production facilities will have to continue and expand to meet the anticipated needs.

Equally pronounced is the change occurring in the leisure habits of American people, which has resulted in the increased demand for recreation and tourist facilities, water and park areas in particular. Portions of the basin have become important vacation targets in recent years because of their fish and wildlife and scenic resources. Visitations to multiple purpose water developments are continuing to grow.

As indicated above a comprehensive study of the basin was made in the late 20's and early 30's. Again in the early 40's studies resulted in an extensive plan of development for the basin. During this whole period study procedures, Federal and State policies, and the economy of the region have been gradually changing, although at times rather drastically. These changes require that the water and related land resource development plans for the Missouri Basin be reviewed and updated to fit current conditions.

The comprehensive framework plan must be dynamic, subject to continual expansion and improvement. No basin plan will be complete or final. Rather, as revisions become necessary, the plan for optimum utilization of the water will become sharper. New developments will be added to those in various stages of planning to be scrutinized for feasibility and general worthwhileness in the overall development of the basin.

It is recognized that the current plan has some, or many, shortcomings, as one might care to look at it. The plan has not fully caught up with current philosophy with respect to water conservation, low flow regulation, water quality control, pumped hydro-power, recreation, fish and wildlife, and others. The need for the plan to be flexible and under continual study is apparent. In some respects the present plan has not been projected far enough into the future.

In looking forward to accomplishing further basin planning, one of the principal needs useful in reappraisal of the basin program is a general economic base survey which will delineate the current condition and provide a projection into both the near and distant future. Similarly broad hydrologic studies would provide a measure of available resources. These basic factors, together with the going programs, may then provide a further insight into the direction which the economy will take and the nature and extent that water resource developmen can and should plan. Thus, forthcoming basin plans for water and related land resource development must be far-sighted and forward-looking; so also must be the detailed specific planning studies.

5. Work to be Accomplished for Entire Study

For the Missouri Basin comprehensive framework study the Missouri Basin Interagency Committee is coordinating the work of the Federal Agencies and the States. Initially the Committee adopted a general definition of scope as follows:

> "The Subcommittee considers that the Comprehensive Framework Plan for the Missouri Basin would consist of studies of an area that provide long-run economic projections of economic development, translation of such projections into demands for water and related land resource uses, hydrologic projections of water availability both as to quantity and quality, and projections to related land resource availability so as to outline the characteristics of projected water and related land resource problems and the general approaches that appear appropriate for their solution."

As a second step the Subcommittee was requested to prepare a detailed outline of the work which would be necessary to accomplish the study. In doing this the Subcommittee set up five work groups corresponding to the parts of the definition of scope. These work groups are:

I Economic Base Study
II Land and Water Needs
III Hydrologic Analyses and Projections
IV Land Resource Availability
V Water and Related Land Resource Development

During fiscal year 1964 these Work Groups prepared outlines for their sections of the study and coordinated them with each other. The work of accomplishing the framework study, coordinating the efforts of the States and Federal Agencies will be carried out by these same groups.

The over-all objective is to produce a long range plan for the optimum use of the water and land resources of the Missouri Basin to enhance the economic wellbeing of the States, the Basin, the Region, and the Nation by full and proper use of the available resources. This will be accomplished by appraising the current economic situation and applying reasonable projections to forecast future economic conditions related to water; utilizing the projections to determine future requirements for water; analyzing the hydrologic conditions to determine water availability; studying land use to ascertain the potential for further or higher land use; making preliminary reconnaissance type studies of resource development in order to assemble a framework plan for the entire Missouri Basin. These studies will indicate potential developments or areas requiring detailed studies for future consideration with an indication of the relative priority of those studies that may be necessary in the near future.

In the following sections is a brief description of the part that the Federal Departments and Agencies thereof will take in the coordinated study. The part that the States will play in this study is currently being developed and is not delineated in this report.

Department of Agriculture

The Department of Agriculture, in cooperation with other concerned agencies, will participate in the formulation of a framework plan which will provide for the needs for water and related land resource development of the Basin. In doing this the Department will assist with the economic base study, having a major role in the agricultural aspects; participate in the hydrologic studies; investigate and appraise the agricultural and rural community water problems such as floodwater and sediment, damage to rural lands and properties, irrigation requirements, and water needs for livestock and rural domestic use, recreation, and fish and wildlife; investigate potentials for the development of upstream watersheds; and appraise the development, use, and management of related agricultural and forest land resources. The total estimated cost for the Department of Agriculture is $1,500,000 and will be requested directly from Congress.

Department of Army

The Corps of Engineers has basic responsibilities in connection with flood control and navigation and for other purposes such as hydroelectric power production, water supply,water quality control, recreation, and others when included in multiple purpose projects involving navigation or flood control. In cooperating with other Federal Agencies and the States in the comprehensive framework studies, the Corps of Engineers will assist in the assembly, interpretation and application of economic data essential to the study; participate in the hydrologic studies; make appropriate navigation studies; undertake flood control studies on the larger streams; do hydropower studies; undertake water supply and water quality studies; make recreational studies of water resource works that may be in our jurisdiction; cooperate in land studies; participate in the studies of water needs and problems; participate in the drawing up of the framework plan for the Missouri Basin; and such other work as is appropriate to this study.

Appropriations for the work of the Corps of Engineers will be requested directly from Congress. The estimate of the total cost of Corps participation in the framework study is $1,/85,000 with a small part ($22,000) for transfer to other Agencies.

Public Health Service

The Public Health Service, in carrying out its basic responsibilities with respect to water pollution control, will develop a program to improve, protect, and preserve a quality of surface and ground waters for all anticipated beneficial uses. The study will be based on as complete a knowledge, as is possible to acquire, of present water quality conditions in the basin, factors which will determine future water quality and alternate means of controlling water pollution to assure satisfactory water quality in the future. Thus, the study will be concerned with present and projected water requirements for domestic, municipal, industrial and agricultural purposes and with the management of the quality of water resources for public health, community growth, industrial and commercial development, recreation, fish, wildlife and agriculture.

Results of the study will supplement other available reports and proposed studies of such agencies as the Corps of Engineers, Bureau of Reclamation, Soil Conservation Service, Federal Power Commission, Department of Commerce, Department of Labor and other Federal Agencies.

The plan will delineate problem areas and suggest possible solutions; project population and economic growth; predict future water supply needs and related waste disposal requirements; outline water quality objectives and proposed means of meeting those objectives; estimate future needs, benefits and costs for stream flow regulations; and suggest research studies or projects necessary to increase knowledge of specific fields of interest. In the development of the plan, careful attention shall be given to maintaining a balance between engineering, economic and planning aspects of long range comprehensive water pollution control programming.

The study will be coordinated with the activities of the other agencies and information supplied as required to meet time schedules of the Comprehensive framework plan. The delay of the intensive phase of the Department of Health Education and Welfare - Public Health Service Missouri River Basin Comprehensive Study requires immediate funding, by direct appropriation, and authority for staffing so that the Public Health Service can timely provide water supply and water quality data to other cooperating agencies.

The Department of Interior

The Department of the Interior is responsible for the development and management of many of the resources of the Missouri River Basin. Nine Interior bureaus will be concerned with comprehensive framework studies and seven of these bureaus are actively participating in the formulation of the framework plan for the development of the water and related land resources of the Missouri Basin to the extent dictated by the segment of the resources base for which each has primary responsibility and to the extent that such resources are interrelated with the Basin's land and water resources.

The Bureau of Reclamation is engaged in various phases of irrigation, water resources development and hydroelectric power development and sale and will be active in almost all phases of the study. Other Interior bureaus will participate in the following activities: hydrologic studies, determination of streamflow and water quality, water requirements on Indian land, analyses of public land resources, mineral studies, determination of water requirements for the minerals industry, recreation studies and projections, fish and wildlife resources studies and projected needs.

Appropriations for the work of the Department of the Interior will be requested directly from Congress. Funds required by the Bureau of Reclamation will be included in Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigation Funds. Funds required by other Interior bureaus will be included in the Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigation Funds transferred to other Interior agencies.

Federal Power Commission

The contribution of the Federal Power Commission to the comprehensive Basin study will include decinnial presentations of existing and future power requirements and supply for appropriate subareas and for the Missouri River Power Region as a whole. These presentations will include indications of the types and sizes of powerplants and generating units, maps indicating the geographic locations of load and supply centers and the related transmission facilities, and tables and charts showing load magnitudes and characteristics.

Emphasis will be placed on evaluating potential hydroelectric projects, including pumped storage developments; on steam-electric plants' requirements for fuel as affecting utilization of Basin fuel resources and waterways transportation facilities; on steam-electric plants' requirements for condensing water as affecting stream temperatures and evaporative losses in cooling towers; and on developing such summary cost data on alternative power sources as may be necessary for preliminary economic evaluations of potential hydroelectric projects.

All of the work will be scheduled and directed to the objectives of the over-all comprehensive planning program and will be done cooperatively with the other Federal agencies and with the consultation and advice of the electric industry in the Basin, including all segments: Federal, investor-owned, public, and cooperative. The total costs of this participation in the framework study is estimated at $90,000 of which $10,000 was obtained in fiscal year 1964 from the Department of Army with the balance to be obtained by direct appropriations.

Department of Commerce

An Economic Base Study by Office of Business Economics will provide data on population and income with projection of these factors, as related to industry, agriculture, etc., to the year 2020. As explained elsewhere, the total allocation to the Missouri Basin Study for the Economic Base Study is not known.

The Weather Bureau has assisted in preparing the detailed plan for the study; work will continue in cooperation with other agencies and the States as the study proceeds; prepare appropriate hydro climatic data and prepare analyses of hydrologic and climatic data as required for the study.

Hydro climatic studies proposed for the Weather Bureau will provide a reliable guide for evaluating irrigation-water requirements and estimating the probability limits of precipitation deficiencies as development of land and water resources progresses. This is estimated to cost $124,000 all of which should be obtained by direct appropriation except nearly $6,000 transferred from the Corps of Engineers in fiscal year 1964.

Department of Labor

The Department of Labor is concerned with development of water and land resources as to its effect on employment and incomes of the people. It is proposed to assist in the economic base studies, particularly with respect to population, employment, out-migration, income levels and sources, and industrial composition. These studies would consist of gathering historical data and making projections appropriate to the area with respect to expected national and regional growth and with relation to associated parameters. When general plans and alternatives for water and related land resource development are made, assistance can be given in evaluating the effect of the proposals on employment opportunities and living standards in the basin. The estimated cost of participation by the Department of Labor is $90,000 of which $500 was transferred from the Corps of Engineers and the balance will be obtained by direct appropriation.

Basin States

The States of Missouri, Kansas, Colorado, Iowa, Nebraska, Wyoming, Minnesota, South Dakota, North Dakota, and Montana are wholly or partly located in the Missouri Basin. The Governors are also members of the Missouri Basin Inter-Agency Committee. These States will participate in the work on the Comprehensive Framework Study of the Missouri Basin. Generally, the States have an interest in and, in some cases, responsibility for most of the functions involved in the water and land resource development of the Missouri Basin. They will enter into the studies in those phases of the work that they feel they can make a significant contribution to.

6. Work Accomplished or to be Accomplished Through FY 65

During Fiscal Year 1964 the agencies and States cooperating in the Study as represented on the Missouri Basin Inter-Agency Committee through the activities of the Standing Committee on Comprehensive Basin Planning and Work Groups thereunder have prepared a detailed plan of study in outline form of the entire undertaking of accomplishing a comprehensive framework study of the Missouri Basin under the accepted general definition of the scope, and as indicated in, and under the constraints in the Guidelines prepared by the Interdepartmental Staff Committee. In the latter part of 1964 some work was initiated under the outline. During 1965 all five Work Groups will actively undertake the critical phases of the overall study, particularly with respect to economics, land availability and hydrology required by other facets of the study.

In the following sections is given a brief statement by individual agencies as to activities in Fiscal Years 1964 and 1965.

Department of Agriculture

With funds made available for FY 64 the Department of Agriculture participated with other agencies in the development of the detailed work outline for the study; analyzed existing data to determine its usefulness; and initiated a plan and schedule of work for gathering other needed data.

In FY 1965 the Department of Agriculture will initiate the economic base study and development of data for the determination of agricultural land and water needs; assemble and analyze data on existing uses of land in the basin; start hydrologic studies in cooperation with other agencies; begin the appraisal of upstream watersheds to determine water and sediment problems, floodwater damages to rural land and property, and needs for irrigation, drainage, rural domestic water, recreation, and fish and wildlife developments; and cooperate with other participants on their activities as is appropriate.

Corps of Engineers

During the Fiscal Year 1964 the Corps of Engineers cooperated with the other Federal Agencies and the States in the preparation of a detailed outline of work required for the framework study of the Missouri Basin. During the latter part of the fiscal year, work was initiated on the Economic Base study through the Office of Business Economics of the Department of Commerce and the Department of Agriculture on a national level. Work was also initiated in the field on studies of this area required to supplement the national studies. Late in the fiscal year the work on the hydrologic and land studies were started. In addition to the above, a review of the reports that the Corps of Engineers has made in the Missouri Basin and the flood data available were started as a basis for carrying on the work and not duplicating or repeating it.

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In fiscal year 1965 work will be carried on in connection with the economic studies with the intent of making initial data available for projecting water needs in some parts of the basin. Work will be continued on the land study and the hydrologic studies. Review of past reports and assembly of flood data should be well along. Navigation studies will be initiated.

Public Health Service

The Regional Office Staff assisted in development of outlines for the Comprehensive Framework Plan. Under general administrative funds, representatives of the Public Health Service have maintained contact with the five major work groups but have been unable to adequately carry forward the Services' basic responsibility.

The Department of Interior

At the close of fiscal year 1964 Interior bureaus had made an analysis of work which would be required to complete the comprehensive study. Interior work groups were established to deal with the five major aspects of the study, namely:

(a) Economic base study and projections.

(b) Water and related land resources needs.

(c) Hydrologic projections.

(d) Land resources availability.

(e) Water and related land resources development.

Representatives of Interior bureaus were assigned to Missouri Basin Inter-Agency Committee work groups and have participated in preparing an outline for the study and developing procedures to be followed. During fiscal year 1965 work will continue largely through the work groups at both the inter-agency and intra-departmental levels. Specific assignments will be carried out by the respective Interior bureaus to advance studies assigned to the respective work groups and task forces. The Missouri River Basin Planning Office was established in fiscal year 1964 and will be continued.

Bureau of Reclamation

At the close of 1963 a general analysis had been made of the work which would be needed to complete the comprehensive study. Representatives of the Bureau served on Work Groups organized among the Interior agencies to deal with the five aspects of the approach as listed above. During 1964 these groups were active in working out details of the outline for the conduct of the study and the organization of the report. Representatives of the Bureau served on Work Groups established by the Missouri Basin Inter-Agency Committee in connection with the development of the outline and related studies. A pilot study for the economic base portion was completed for two areas in Region 7. During FY 1965 work will continue largely through the Work Groups at both the Inter-Agency and Intra-Departmental levels. Specific assignments will be made through the Work Groups principally in the matter of inventory of water records and the assembly of data on land and analysis of economic factors. Specific topics will be studied as a basis for analyzing land and water needs and relating them, in furtherance of the framework plan. The Missouri River Basin Planning Office established in FY 1964 will be continued. Financial support of the Office of Business Economics, Department of Commerce, will continue.

Geological Survey

Work of the Geological Survey on a Comprehensive Framework plan for the Missouri River Basin provides for the compilation, analysis and projection of hydrologic data. Initially, there will be an inventory of available data, including previously unpublished records of streamflow and ground-water levels collected by other Federal and State agencies. The Survey plans, then, to provide interpretive data such as maps showing availability of ground water and other special reports as determined by the needs of the participants.

Bureau of Indian Affairs

As of June 30, 1964 preliminary outlines had been made of work to be accomplished under the Missouri Basin Comprehensive Planning Study. During FY 1965 data will be assembled on acres of Indian reservation land physically suitable for irrigation, on irrigation water requirements for these lands, and on the sources and availability of the water supply, including water rights, for these lands. Preliminary plans will be formulated for subsequent investigation of other aspects of the study of importance for the development of Indian resources.

Bureau of Land Management

No funds were available in fiscal year 1964. Bureau representatives participated in the work of groups preparing the outline for the framework study and prepared a partial inventory of information available to the BLM portions of the study outline.

The program through fiscal year 1965 will be restricted by funds ($5,000) to the completion of work outlines, the refinement of definitions, and the correlation of the contribution expected from BLM with the work schedules of other agencies. Data on the public lands will be assembled by counties and study areas from available sources. Procedures to be followed in an analysis of the effects of authorized Resource Development Programs on land use, productivity and water availability in sample watersheds will be prepared.

Bureau of Mines

Work units to be undertaken by the Bureau of Mines in FY 1965 include: (1) An economic base study of existing mineral industry in the Missouri Basin; (2) an analysis of existing land uses by the mineral industry; and (3) an investigation of existing water requirements by that industry.

Bureau of Outdoor Recreation

In fiscal year 1965 the Bureau of Outdoor Recreation will collect and interpret available recreation reports pertaining to all or parts of the Missouri River Basin. Updating of the information contained in the reports will be accomplished by compilation of additional data through the Nationwide Outdoor Recreation Plan. Outdoor Recreation inventory forms have been sent to the States for completion. Existing and potential recreation data are requested on State and local areas, cities, and town. Agreements have been made, or will be made with Federal agencies to obtain the same type data on Federal areas.

During FY 1965, the above data will be tabulated for the Missouri River Basin portion of the States involved. An inventory of existing and potential outdoor recreation areas will be compiled by regions of the basin, giving the acres of land and water, classification of areas, principal recreation activities, recreation days, and recreation facilities.

The proposed budget estimate for FY 1965 of $18,000, to be transferred from Bureau of Reclamation Construction and Rehabilitation Missouri River Basin Project investigation funds.

Fish and Wildlife Service

During fiscal year 1964, the Fish and Wildlife Service participated in the development of the outline for the Comprehensive Framework Study. The Service is represented on all five Interior Work Groups. A number of meetings of all Work Groups were attended to insure that appropriate consideration for fish and wildlife resources, sport and commercial, was reflected in the outline ultimately adopted.

A survey of the current status of sport fish and of wildlife resources and habitat, including State and Federal management areas, will be initiated. This will entail a location, compilation, and review of existing and available information. Data will be provided to the Work Group on Land Resources Availability on areas administered by the Fish and Wildlife Service. A start will be made on determination of land available and adaptable for alternate beneficial uses. Existing data on commercial fishery resources will be reviewed and a survey initiated on the current status of commercial fisheries. Coordination with other agencies engaged in development of the Comprehensive Framework Plan will be maintained.

Federal Power Commission

Work performed in FY 1964 included coordination with other agencies in preparation of the report outline. During fiscal year 1965 preparation of maps, tables, and charts showing the current status and characteristics of power requirements and the principal electric facilities constituting the power supply in the Missouri River Power Region will be undertaken, and steps will be initiated on future power requirements and needs.

Department of Commerce

The Office of Business Economics work was outlined during conferences with Departments of Interior, Army, and Health Education and Welfare, and coordinates with a complimentary study by Economic Research Service of Department of Agriculture and compilation of data was started. This will continue during FY 1965 with special attention being given to the immediate needs of Work Groups involved in the Missouri Basin comprehensive framework study.

During 1964 the Weather Bureau assisted in outlining the study with particular respect to hydrologic work.

Funds in the amount of $6,000 transferred from the Corps of Engineers to the Weather Bureau in FY 64 were used to conduct two pilot projects in the analysis of hydro-climatic data essential to other parts of the study. These pilot projects were completed and computer programs developed. Since no direct appropriations were made for conducting the studies in FY 1965, it appears work will be delayed until financing can be arranged.

Department of Labor

Representatives of the Department of Labor participated in outlining in detail the proposal for accomplishing the economic base study during 1964. Coordination of work to be done in the field with the national studies being undertaken by OBE was undertaken. It is anticipated that work will be continued in the analysis of employment and income data during the fiscal year 1965.

Basin States

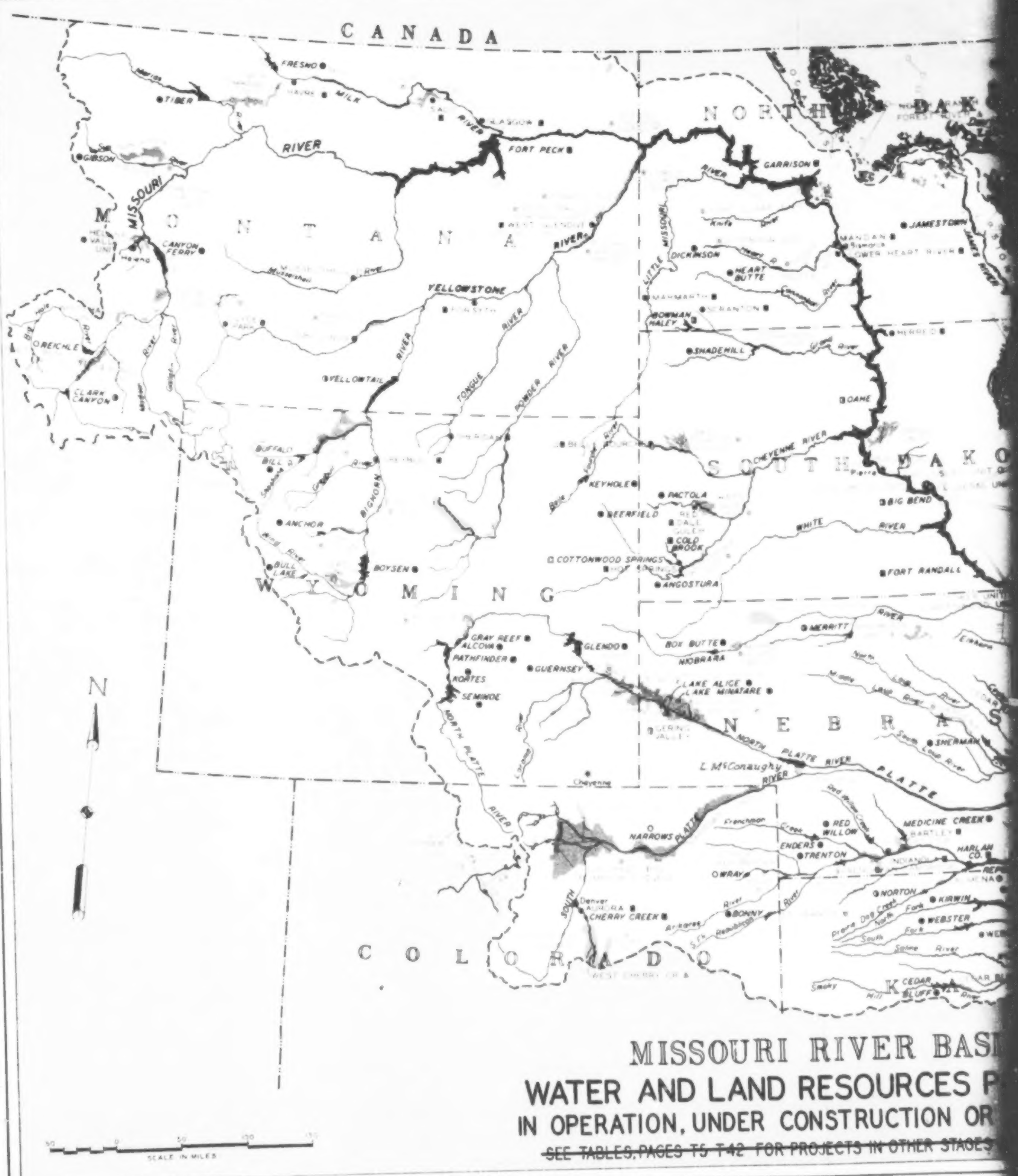
Representatives of the Basin States have participated in outlining in detail the work to be accomplished in the overall study. It is expected that they will participate in those phases in which they can make a significant contribution.

7. Program for Fiscal Year 1966

During FY 1965 most facets of the study program will either be underway or initiated. Particular effort will be placed on the Economic Base Study and Hydrologic Studies which are basic to determine needs and availability of water. Other programs will principally be in assembly and appraising past studies and gathering data to correlate with needs and availability of water and related land resources as these become available.

It is anticipated that sufficient progress will be accomplished on the prerequisite parts of the study that early in FY 1966 studies of needs and problems related to development of water and related land resources can be initiated in at least one and possibly two or three regions of the Missouri Basin. In the latter part of FY 1966, it is expected that initial studies of potential developments and alternative proposals will be started. Thus, by the end of FY 1966, it is expected that all facets of the study will be underway. In this connection, lack of funding in FY 1965 for climatic work and studies of water supply and water quality and limited funding of some other facets of the study may delay full planning of all purposes or functions during the initial studies of needs and framework planning during FY 1966.

Work of individual departments and agencies during FY 1966 is given in more detail under individual agency justification sheet following


CANADA
MONTANA
NORTH DAK
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WYOMING
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COLORADO
MISSOURI RIVER
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YELLOWSTONE
RIVER
BIGHORN
TONGUE RIVER
POWDER RIVER
LITTLE MISSOURI
CHEYENNE RIVER
WHITE RIVER
NIOBRARA
NORTH PLATTE RIVER
PLATTE
SOUTH PLATTE
Frenchman Creek
Red Willow Creek
Republican River
Smoky Hill
Saline River
South Loup River
North Loup
Knife River
Heart R.
Cannonball River
Grand River
James River
Belle Fourche River
Marias River
Musselshell River
Big Hole River
FRESNO
TIBER
GIBSON
GLASGOW
FORT PECK
CANYON FERRY
Helena
REICHLE
CLARK CANYON
YELLOWTAIL
BUFFALO BILL
ANCHOR
BULL LAKE
BOYSEN
GARRISON
DICKINSON
HEART BUTTE
MARMARTH
BOWMAN HALEY
SCRANTON
SHADEHILL
MANDAN
Bismarck
LOWER HEART RIVER
JAMESTOWN
MERRED
OAHE
Pierre
BIG BEND
FORT RANDALL
KEYHOLE
PACTOLA
DEERFIELD
RED DALE GULCH
COLD BROOK
COTTONWOOD SPRINGS
HOT SPRINGS
ANGOSTURA
FORSYTH
GRAY REEF
ALCOVA
PATHFINDER
KORTES
SEMINOE
GUERNSEY
GLENDO
Cheyenne
BOX BUTTE
MERRITT
LAKE ALICE
LAKE MINATARE
L. McConaughy
SHERMAN
NARROWS
Denver
AURORA
CHERRY CREEK
WEST CHERRY CR.
WRAY
BONNY
ENDERS
TRENTON
RED WILLOW
MEDICINE CREEK
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MISSOURI RIVER BAS

WATER AND LAND RESOURCES P

IN OPERATION, UNDER CONSTRUCTION OR

~~SEE TABLES, PAGES T5-T42 FOR PROJECTS IN OTHER STAGES~~

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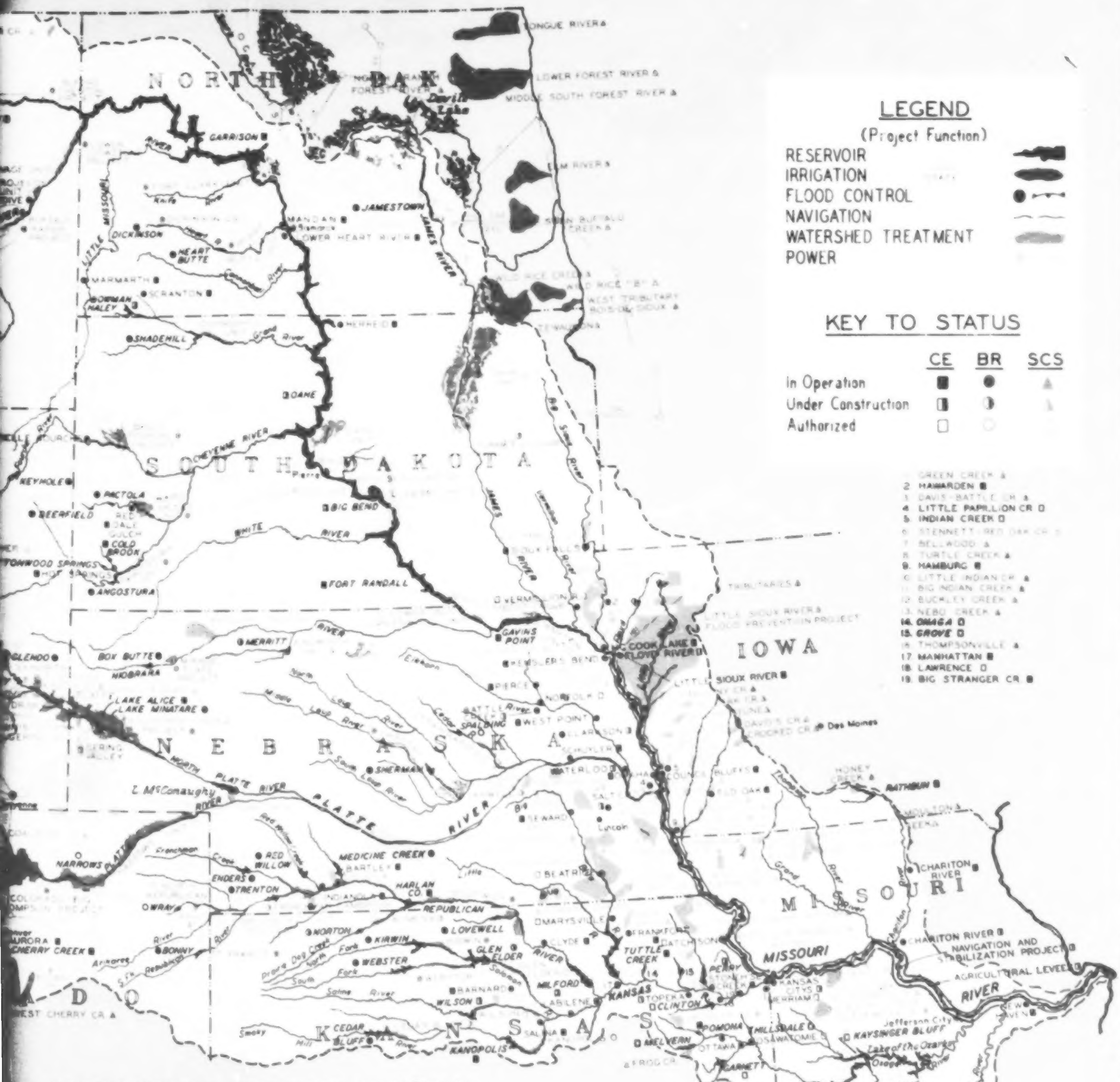
LEGEND
(Project Function)
RESERVOIR
IRRIGATION
FLOOD CONTROL
NAVIGATION
WATERSHED TREATMENT
POWER
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SCS
In Operation
Under Construction
Authorized
1 GREEN CREEK
2 HAWARDEN
3 DAVIS-BATTLE CR
4 LITTLE PAPILLION CR
5 INDIAN CREEK
6 STENNETT-RED OAK CR
7 BELLWOOD
8 TURTLE CREEK
9 HAMBURG
10 LITTLE INDIAN CR
11 BIG INDIAN CREEK
12 BUCKLEY CREEK
13 NEBO CREEK
14 OMAGA
15 GROVE
16 THOMPSONVILLE
17 MANHATTAN
18 LAWRENCE
19 BIG STRANGER CR
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
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BOWMAN HALEY
SHADEHILL
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FORT RANDALL
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BOX BUTTE
MERRITT
LAKE ALICE
LAKE MINATARE
GLENDO
SHERMAN
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NORTH PLATTE RIVER
PLATTE RIVER
MEDICINE CREEK
RED WILLOW
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HARLAN CO.
REPUBLICAN
LOVEWELL
NORTON
KIRWIN
WEBSTER
GLEN ELDER
WILSON
CEDAR BLUFF
KANOPOLIS
MILFORD
TUTTLE CREEK
PERRY
CLINTON
POMONA
MELVERN
HILLSDALE
KAYSINGER BLUFF
POMME DE TERRE
STOCKTON
FT SCOTT
RATHBUN
CHARITON RIVER
NAVIGATION AND STABILIZATION PROJECT
AGRICULTURAL LEVEES
MISSOURI RIVER
LITTLE SIOUX RIVER
Des Moines
Lincoln
KANSAS CITY
Jefferson City
Lake of the Ozarks

MISSOURI RIVER BASIN

ER AND LAND RESOURCES PROJECTS

RATION, UNDER CONSTRUCTION OR AUTHORIZED

~~BLES, PAGES T5 T42 FOR PROJECTS IN OTHER STAGES OF DEVELOPMENT~~

JULY 1964

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September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. U. S. Department of Agriculture

2. Program of Entire Study--Estimate $1,500,000

Cost

The estimated cost of the Department of Agriculture participation in the comprehensive survey of the Missouri River Basin is $1,500,000.

Objective

The objective of Department of Agriculture participation in a comprehensive survey of the Missouri River Basin is to develop information on present and prospective uses of the land for agricultural and forest production, evaluate influence of other factors upon agricultural economy of the basin, and to appraise the agricultural, rural, and upstream watershed needs of the Basin, and to participate in the formulation of a framework plan for the coordinated and orderly control and regulation, management and use of the water and related land resources of the entire basin which includes such structural and associated land treatment measures as are needed to satisfy those needs.

Scope

The following is a description of the general scope of the Department of Agriculture's participation in the Missouri River Basin Study:

A. Inventory and classify land and forest resources of the basin in terms of present and potential alternative uses, physical characteristics, productivity, and management levels.

B. Economic inventory, analysis, and interpretation of the agricultural needs and requirements of the basin.

(1) Projected needs for products of the land:

Based on projections of future national requirements for agricultural products (based on assumed population growth, increased levels of GNP and per capita income, expected patterns of consumer preference, and anticipated levels of agricultural imports and exports), determine future agricultural and forest products requirements of the Missouri Basin (based on expected shifts between the regions, considering production efficiencies, marketing costs, quality and kind of products produced and availability of natural resources for agricultural use.)

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(2) Characteristics of the Agricultural Economy:

Analysis of present agricultural economy of the basin, agricultural use of land and water, and the output of agricultural products.

(3) Production Practices and Costs:

Analysis of production practices and costs for major crop enterprises and projection of impact of technological development on production practices and performance rates.

(4) Production Technology:

An appraisal of future crop and pasture yields based on development and application of improved production technology, further application and improvement of soil and water conservation practices, and expected intensification of production practices.

(5) Projected Non-agricultural Requirements for Land:

Cooperate with other interested agencies to develop projections of urban, industrial and other non-agricultural requirements of land in the basin, and expected retirement of land, not suited to cultivation, to less intensive use.

(6) Projected Agricultural Requirements for Natural Resources:

Determination of acreage requirement and identification of a pattern of land use for meeting allocated agricultural product needs most efficiently.

(7) Impact of Development on Agricultural Activity and Employment:

Appraisal of additions to or improvements in the resource base--modified patterns of use, costs of agricultural production, marginal costs, total outlay of economic resources required to satisfy future agricultural product needs, and relationship to employment opportunities.

C. Appraise the relationship of agricultural and rural water problems and needs to the economic development of the River Basin.

D. Appraise National Forest Multiple Use Management in relation to the optimum development of the water and related land resources of the basin.

E. Appraise the land, forest, and water resources available for potential recreational use.

F. Appraise the agricultural and rural community water problems and needs for water resource development. Water problems to be inventoried include floodwater and sediment, damage to rural lands and properties, irrigation requirements, water needs for livestock and a rural domestic use, recreation, fish and wildlife.

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G. Investigate potentials for water storage development and other appropriate structures within the upstream watersheds which will provide for needs both within and outside of the subwatersheds. The storage requirements for municipal and industrial water supply and water quality control will be based on information provided by the Public Health Service on the needs for such storage.

H. In cooperation with other concerned agencies consider alternate methods of development and participate in the formulation of a framework plan which will provide for the needs for water and related land resource development of the Basin.

Detail of Surveys and Investigations

Studies and investigations will be generally limited in detail, but will be compatible with the nature and magnitude of the program decisions to which they relate. Existing data and information on land and forest conditions, use, and management will be used for the determination of prospective use and management of these resources. Available information from P.L. 566 watershed project studies and similar data will be utilized whenever appropriate. Sampling procedures will be used to the maximum feasible extent.

3. Program to be Accomplished in Fiscal Year 1966 - Estimate $341,000

During fiscal year 1966, the economic base study will be continued and a start made in projecting future needs for agricultural and forest products; the analyses of existing land uses will be completed and projections on future land uses will be initiated; begin appraisal of water requirements for rural, domestic, livestock and irrigation use; in cooperation with other agencies complete inventory of hydrologic data and begin the analyses and interpretation of basic hydrologic data; continue the appraisal of upstream watersheds to determine water and sediment problems, floodwater damages to rural land and property and the need for irrigation, drainage, recreation, and fish and wildlife developments; and cooperate with other participants in their activities as appropriate.

4. Source of Funds:

Direct appropriation - $341,000

Funds required for remaining years of study:

1967	$393,000
1968	$330,000
1969	$141,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of Army - Corps of Engineers

2. Program for Entire Study - Estimate $1,763,000

The Corps of Engineers will be one of seven Federal Departments cooperating with the ten basin States through the Missouri Basin Inter-Agency Committee in the accomplishment of the comprehensive framework study of water and related land resource development of the Missouri Basin.

The overall purpose of the study is to appraise the current economic situation and apply reasonable projection for this region of the nation to obtain a forecast of probable future economic conditions related to water resources; convert such forecasts into water resource needs; utilizing available studies supplemented as necessary, analyze the hydrologic conditions to determine current and future water availability; determine the extent that existing (and under construction) development works can meet needs and problems; make preliminary reconnaissance type studies including review of past reports and studies of water resource works needed to meet needs and provide solution to problems; assemble a framework type plan which will indicate potential developments or areas requiring detailed studies for future consideration and authorization with an indication of the relative priority of those studies that may be necessary in the next 20 years.

The Corps of Engineers in cooperation with other agencies will assist in the assembly, interpretation and use of the economic base study; have a large part in the hydrologic studies; make the navigation studies; do flood control studies on the larger streams; participate in hydropower studies; undertake water supply and water quality studies to meet needs in these fields, make recreational studies of water resource development works that may be in our jurisdiction; and other facets of the water and related land resource development work as appropriate to our responsibilities.

3. Program to be Accomplished in Fiscal Year 1966 - Estimate $400,000

With funds for FY 1966, it is expected that coordination with other agencies and states will continue. The preliminary planning necessary to establish work to be done and elimination of duplication should be largely completed but will need to receive continued consideration. It is expected that participation in the work of interpretation and application of the economic base study will be continued. It is expected that the hydrologic studies will be continued jointly by the several interested agencies.

Flood studies will be undertaken, correlating, updating, and supplementing past studies. Summarizing of basin needs and problems would be initiated as information becomes available. Navigation studies will be started.

Preliminary work will be initiated on other facets of water development and use. This work will be carried on in cooperation with other Federal agencies and the States under the guidance of the Standing Committee on Comprehensive Framework Studies of the Missouri Basin Inter-Agency Committee.

4. Source of Funds:

Direct Appropriation, FY 1966 - $400,000

Funds required for future years of study:

FY 1967	$400,000
FY 1968	$300,000
FY 1969	$285,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of Health, Education & Welfare - Public Health Service

2. Program for Entire Study - Estimate $430,000

The estimated cost, $430,000.00, indicated for the Public Health Service, Department of Health, Education and Welfare in the tabulation entitled "Coordinated Comprehensive River Basin Planning Estimates (Missouri River Basin)" does not represent the total proposed budget or probable cost to complete the Public Health Service, Department of Health, Education and Welfare's comprehensive study. These figures represent only the cost of providing the other agencies with water supply and water quality data assuming that (1) the Department of Health, Education and Welfare's comprehensive study, which will develop water supply and water quality data as a regular function of determining waste load, treatment requirements and flow regulations will be actually underway in the basin and the existing staff and equipment would be sufficient to analyze and present the data in the form the other agencies require and (2) the timing of the need for such data will coincide with the Public Health Service, Department of Health, Education and Welfare's comprehensive study in the basin.

The objectives of the Public Health Service's study is to develop a comprehensive water quality and pollution control program for the Missouri River Basin evaluating the influence of existing and proposed land and water resources developments on water quality and to cooperate with six Federal Departments and ten Basin States in the formulation of a framework plan of land and water resource development for the Missouri River Basin.

The purpose of the study will be to develop a program to improve, protect, and preserve a quality of surface and ground waters for all anticipated beneficial uses. The study will be based on as complete a knowledge, as is possible to acquire, of present water quality conditions in the basin, factors which will determine future water quality and alternate means of controlling water pollution to assure satisfactory water quality in the future. Thus, the study will be concerned with present and projected water requirements for domestic, municipal, industrial and agricultural purposes and with the management of the quality of water resources for public health, community growth, industrial and commercial development, recreation, fish, wildlife, and agriculture.

Active cooperation with Federal, State and local agencies will be needed as the study envisions utilization of all available data. Means of obtaining additional data necessary to achieve the objectives will be provided.

The project will involve correlative and cooperative study with State agencies, the governmental agencies and others having an interest in water resources development. The study will be made in cooperation with Federal agencies, such as: The Corps of Engineers of the Department of the Army, the Bureau of Reclamation, and other bureaus, surveys and services of the Department of the Interior, the Department of Agriculture, the Department of Commerce, the Department of Labor, and other Federal agencies. In addition, public and private institutions will be consulted in order to utilize all available competencies.

Results of the study will supplement other available reports and proposed studies of such agencies as the Corps of Engineers, Bureau of Reclamation, Soil Conservation Service, Federal Power Commission, Department of Commerce, Department of Labor and other Federal Agencies.

The data obtained will be utilized in the development of a comprehensive river basin water quality and pollution control program for the entire Missouri River Drainage Basin which will serve as an aid to Federal, Interstate, State and local jurisdictions in planning, developing and coordinating future water resources management programs.

The plan will delineate problem areas and suggest possible solutions; project population and economic growth; predict future water supply needs and related waste disposal requirements; outline water quality objectives and proposed means of meeting those objectives; estimate future needs, benefits and costs for stream flow regulations; and suggest research studies or projects necessary to increase knowledge of specific fields of interest. In the development of the plan, careful attention shall be given to maintaining a balance between engineering, economic and planning aspects of long range comprehensive water pollution control programming.

3. Fiscal Year 1966 - Estimate $100,000

This estimate does not represent the total budget or probable cost to complete a PHS-DHEW comprehensive study for the Missouri River Basin. The figure represents only costs of providing the other agencies with water supply and water quality data assuming that the timing of the need for such data will coincide with the PHS-DHEW comprehensive study in the Basin.

4 Sources of Funds

Direct Appropriation - $100,000

Funds required for remaining years of study:

FY 1967	$130,000
FY 1968	$100,000
FY 1969	$100,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Bureau of Reclamation

2. Program for Entire Study - Estimate $1,500,000

Development of the Basin's water and related land resources has been advanced substantially under the Pick-Sloan Plan. This plan envisions the conservation and use of the Basin's water resources through cooperative efforts of Federal, State, and local governments. The objective is to stabilize and increase agricultural and industrial productivity, establishing new economic opportunities in the Basin for a growing America.

The comprehensive study of the water and related land resources will appraise the Basin's needs and propose means of fulfilling those needs based upon current economic conditions and trends and projections for about a 50-year period. Current program activities and proposed investigations will not be affected by the comprehensive study.

The work of the Bureau of Reclamation will be carried out pursuant to instructions by the Secretary of the Interior. The work will be prosecuted, in large measure, in the framework of the Committee and work-group assignments of the MBIAC and IMBFC. The studies will be carried out in the following categories:

A. Economics - Studies of the existing economic status of the Basin, with particular reference to water resource development; analysis of population trends in the Basin as a whole and in various segments, both metropolitan and rural; analysis of potential industrial, mineral and agricultural development.

B. Translation of economic projections into needs - Need for agricultural development including irrigation; hydroelectric power; municipal and industrial water; recreation including fish and wildlife; water quality control; and conflicts in land and water needs.

C. Projections of water availability - Analysis of existing data on surface water and ground water, and collection of additional data or preparation of estimates to fill gaps; analysis of records of quality, both physical and chemical; preparation of data on water availability at specific points for identified uses.

D. Projections of availability of related land - Determine present extent of irrigation; analyze future irrigation possibilities for which firm data are available; estimate possibilities of additional irrigation from reconnaissance data.

E. General Studies - Resolution of specific questions as they arise; and work on the overall task of putting all aspects of the study into a report.

Much progress has been made during recent years under the Missouri River Basin Project in the development and beneficial use of the Basin's water and related resources. The current program must be continued.

Changing economic, municipal, industrial, and agricultural conditions are of such magnitude as to warrant a comprehensive appraisal of future requirements for water and related land resources and to provide a long-range framework for meeting those needs within the available resources. Economic projections in our changing economy should be made for about a 50-year period. The resulting requirements in terms of water and lands must be projected and general plans for a 10 to 15-year period developed for their comprehensive use in the light of the projected needs.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $379,000

Economic base and hydrologic base studies will be made with available data. Needs for water, inventory, and analyses of land available and adaptable to alternative beneficial uses, and identification of the general nature and scope of water resource development needs which will be encountered in future periods will be evaluated. Specific topics will be studied as a basis for analyzing land and water needs and relating them, in furtherance of the framework plan.

The work will be continued under the coordinating direction of the Missouri Basin Inter-Agency Committee, acting through its Standing Committee on Comprehensive Basin Planning. Much of the work will be accomplished by functioning through work groups of the MBIAC and the IMBFC.

4. Source of Funds:

Direct appropriation (Public Works Appropriation, Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations).

Direct appropriation, FY 1966 - $379,000

Funds required for remaining years of study:

FY 1967	$308,000
FY 1968	$335,000
FY 1969	$120,000

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September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Geological Survey

2. Program for Entire Study - Estimate $85,000

Participation by the Geological Survey in Missouri River Basin Comprehensive Planning consists of the compilation and interpretation of data on streamflow, ground water and water quality. Much of this information has been previously published in basic-data form and represent the results of water resources investigations conducted for many years in cooperation with agencies of State and Federal government and supplemented since 1946 by Missouri River Basin Project funds. To prepare these data to meet comprehensive planning requirements will cost an estimated $85,000 during the years 1965-1968.

As a first step in its part of the program, the Geological Survey will inventory available records of streamflow, ground water and chemical quality of water. Data collected by the States and other Federal agencies will be incorporated in the inventory. Basic water-resources data will then be processed, analyzed and interpreted for the use of other work groups and other Federal and State agencies participating in the Basin study.

The Survey will assist other participating agencies in the projection of hydrologic data, both as to areal coverage and to the effects of proposed developments.

As planning studies progress, there will doubtless come to light previously unsuspected areas of deficient hydrologic data, or deficiencies in types of hydrologic data. Thus, the principal purposes of this program is to inventory and supply in various forms all available water-resources data and to maintain a continuing study of data requirements to preclude serious deficiencies in basic data when subsequent development studies are made.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $35,000

The inventory of basic data will be accomplished largely in 1965. During 1966 there will be analyses and projections of these data to aid in the solution of hydrologic problems encountered by other agencies and work groups engaged in this study. Present plans also call for the preparation of maps showing ground-water conditions. As these activities develop, areas of data deficiency will be noted and remedial plans made. It is anticipated that the Survey will participate in studies of alternate water development proposals to judge the effects of alternate actions on the hydrologic system.

4. Source of Funds:

Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations Funds transferred to other Interior agencies.

Transfer funds: FY 1966 $35,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Bureau of Indian Affairs

2. Program for Entire Study - Estimate $27,000

Discharging trust responsibilities of the Bureau of Indian Affairs relating to Indian properties involves close contact and cooperation with Indian people residing in the Missouri River Basin.

Part of this responsibility is to promote the development of Indian resources, create employment opportunities for Indians, and help Indians to utilize their resources and capabilities for economic and social advancement. A knowledge of Indian resources and an understanding of Indian people are essential to the formulation of effective plans for the best use of physical and human resources. Promoting effective use of water and water related resources by Indian people is a major function of the Bureau of Indian Affairs. Its major job in connection with the Missouri Basin Comprehensive Plan is to disclose, evaluate and protect Indian interests and opportunities.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $10,000

The major work during fiscal year 1966 will continue along lines pursued during 1965 being largely concerned with assembling of data on acres of Indian reservation land physically suitable for irrigation, on irrigation water requirements for these lands, and on the sources and availability of the water supply, including water rights, for these lands.

4. Source of Funds:

Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations Funds transferred to other Interior agencies.

Transfer funds: FY 1966 $10,000

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September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Bureau of Land Management

2. Program for Entire Study - Estimate $45,000

The Bureau of Land Management is concerned with the 22 million acres of public domain and acquired land it administers in the Missouri River Basin. These public lands occupy a significant position in a number of watersheds of the upper reaches of the river. Available information as to location, present use of resources and the physical characteristics of these lands will be analyzed to determine their present use and their capabilities for future development. The study will indicate the role of the public land in meeting the land resource requirements by sub-areas of the Missouri River Basin and will show the effects of resource development programs on the quantity and quality of water from the watersheds.

On the basis of location, present use, production and physical characteristics which determine the capability of these lands for future use the study will show for all lands:

(a) Areas adapted to resource development programs and management for multiple use of resources.

(b) Areas best suited for special alternate uses and for management by other Federal or by State agencies.

(c) Lands not included in special management programs.

The effects of conservation and improvement programs in the resource management areas on productivity of the public lands, on the potential for alternate uses and on water quantity and quality from the public land areas will be estimated from analyses of sample watersheds in representative conservation areas in each administrative district. The analysis will consider in each sample watershed the resources development work completed by 1965, the work planned for the future, and the effects of soil treatment, water control structures, facilities for use and protection, and management of vegetal growth, use by domestic animals and wildlife, recreation opportunities, and on water runoff. It will consider generally: (a) potential alternate uses; (b) possible changes in the volume and quality of water in streams; and (c) the relation of these lands to proposed major water resource structures.

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3. Program to be Accomplished, Fiscal Year 1966 - Estimate $35,000

The major part of the total program will be accomplished in fiscal year 1966. It will include for all significant public land areas a summary by sub-areas of: (a) the location, productivity and classification as to present use; (b) a summary of the long range resource development programs; (c) an analysis of anticipated effects on productivity, alternate uses of land, significant effects on water availability and relation of land and water use on proposed water developments.

4. Source of Funds:

Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations funds transferred to other Interior agencies.

Transfer funds:	FY 1966	$35,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Bureau of Mines

2. Program for Entire Study - Estimate $60,000

Total mineral output of the 10 Missouri Basin States in 1963 was valued at $2,472 million, a gain of 3.6 per cent over 1962 and a record new high. Mineral resources are one of the area's most promising fields for further industrial development, provided that the water required for their processing is made available.

Work of the Bureau of Mines on a comprehensive framework plan, budgeted at $60,000 for the entire program, will consist of four elements: (1) An economic base study of existing mineral industry and projections of future development; (2) an analysis of existing land uses by the mineral industry and estimates of future requirements; (3) a summation of water requirements for existing and anticipated mineral industry; and (4) identification of needs and objectives for a general plan of development that will consider the best use or combination of uses of water and related mineral resources to meet all foreseeable short- and long-term needs.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $20,000

Work will center on a (1) completion of an economic base study of existing and projected mineral industry; (2) analysis of land available for mineral development and adaptable to supplementary beneficial uses; and (3) determination of present water requirements of mining, milling, and refining facilities.

4. Source of Funds:

Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations funds transferred to other Interior agencies.

Transfer funds:	FY 1966	$20,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Bureau of Outdoor Recreation

2. Program for Entire Study - Estimate $73,000

Total cost of the study over the four-year period, 1965 to 1968, will be $73,000 transferred from Bureau of Reclamation Construction and Rehabilitation project investigation funds.

The purpose of the study is to provide a broad basis for guiding future consideration of outdoor recreation development in the Missouri River Basin for optimum results in meeting future needs.

Within the scope of the study the Bureau of Outdoor Recreation will develop comprehensive basinwide recreation plans giving adequate recognition to the full range of recreation purposes, needs, potentialities, and proposals.

The study will include sufficient detail to: Evaluate the present and potential supply of outdoor recreation resources, analyze present and future demand for outdoor recreation opportunities, determine present and future needs for outdoor recreation areas and facilities, recommend alternative ways of meeting those needs, and prepare an integrated program for outdoor recreation development.

Justification of the study is based on providing optimum outdoor recreation opportunities for the people of the basin in conserving, developing and utilizing recreation resources compatible with other types of development.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $19,000

During fiscal year 1966, the Bureau of Outdoor Recreation will make any necessary revisions in inventory of existing recreation areas and facilities at water, forest, park, scenic, and historical sites. Nationwide Plan data will be the basis for such revisions, if they are necessary.

The study will be in its second phase in fiscal year 1966, requiring translation of economic projections into demands for land, water, and facilities. Such factors as population, economic activity, leisure time for and interest in outdoor recreation, disposable personal income, and transportation facilities will be taken into account in projecting demand for outdoor recreation to 1980, 2000, and 2020.

Present demand will be compared with the present supply of recreation resources to determine if a need now exists. Estimates will be made also of future recreation needs for land and water resources and projections to meet those needs.

4. Source of Funds:

Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations funds transferred to other Interior agencies.

Transfer funds:	FY 1966	$19,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of the Interior - Fish and Wildlife Service

2. Program for Entire Study - Estimate $60,000

The Fish and Wildlife Service proposes to conduct a comprehensive fish and wildlife study to identify public needs for sport and commercial fish and wildlife resources and the general approaches that appear appropriate for meeting these needs.

A broad survey will be undertaken of sport and commercial fish and wildlife resources and their habitat, with emphasis on resources and habitat which could be benefited through comprehensive planning. Anticipated fish and wildlife needs, problems and opportunities will be identified. The extent to which these needs can be met, problems solved, and opportunities realized will be pointed out.

The Fish and Wildlife Coordination Act and the principles set forth in Senate Document No. 97 (87th Congress, 2nd Session) now establish equal partnership for the conservation and development of fish and wildlife resources with those of other resources in the Federal water resources development program. Expanding populations and increased leisure time of our Nation's citizens are causing heavy demands for additional opportunities for sport fishing and hunting and related recreational pursuits. Construction of large reservoirs also presents opportunity for harvesting millions of pounds of fish for human and animal consumption. Fish and Wildlife Service participation in the Comprehensive Framework Study is intended to meet national responsibilities in these fields in the Missouri River Basin.

3. Program to be Accomplished, Fiscal Year 1965 - Estimate $15,000

The survey of the current status of sport fish and wildlife resources and habitat, to be initiated in fiscal year 1965, will be essentially completed, as will a similar survey of the current status of commercial fisheries. This will permit a start on identification of unfulfilled needs as well as problem areas requiring further study. Basic fish and wildlife information will be furnished, as required, to all Work Groups. Coordination with other agencies, through the five Interior Work Groups and the Interior Task Force, will be continued.

The information to be obtained on the current status of sport and commercial fishery resources and wildlife resources and habitat will provide the base from which existing and future needs can be measured. These steps are prerequisite to development of a generalized plan to meet the identified needs and to solve the associated problems. Close liaison with all agencies involved in development of the Comprehensive Framework Plan is essential to avoid duplication of effort, resolve conflicts, and exchange information.

4. Source of Funds:

Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigations funds transferred to other Interior agencies.

Transfer funds:	FY 1966	$15,000

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN - Comprehensive Framework Study for Basin Planning

1. Federal Power Commission - Chicago Regional Office

2. Program for Entire Study - The incremental costs of which are estimated at $90,000, will include the following investigations and presentations:

(1) Preparing presentation of appropriate data on electric power in Missouri River Power Region on a current basis including:

a. Maps showing (1) existing principal electric facilities (generating plants and transmission lines) and (2) the major load centers and demands therein.

b. Tables and charts showing load magnitudes and characteristics by subareas and for Missouri River Power Region.

Note: This data will have to be kept current and advanced nearer to time of report release, i.e., possibly to 1965.

(2) Estimating future power requirements for appropriate subareas and Missouri River Power Region at 20-year intervals to year 2020.

(3) Preparing maps and tables designating locations of load centers and power supply centers at 20-year intervals to year 2020 indicating type and size of plants constituting power supply.

(4) Preparing presentation on existing and potential hydroelectric power supply including pumped storage projects.

(5) Preparing summary cost data (capital, annual, or unit, as appropriate) pertaining to:

a. Hydroelectric plants

Conventional
Pumped storage

b. Conventional steam-electric plants

c. Peaking steam-electric plants

d. Nuclear steam-electric plants

e. Transmission lines

f. Fuel - at source and at generating plant sites

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(6) Determining quantities of coal required and general locations where required - as affecting navigation.

(7) Preparing presentation on water requirements for steam condensing - including effect on stream temperatures - and evaporative losses in cooling towers.

(8) Writing an Appendix on Power summarizing the results of the foregoing investigations and findings.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $16,000

(1) Bring maps and tables showing existing principal electric facilities and power requirements by load areas to current basis.

(2) Review estimates of subareas' future power requirements.

(3) Conclude work on determining types and general locations of future generating stations.

(4) Initiate investigations described under items (6) and (7) of above paragraph 2.

4. Source of Funds:

Direct Appropriation, FY 1966 - $16,000

Funds required for future years of study:

FY 1967	$16,000
FY 1968	$16,000
FY 1969	$16,000

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September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of Commerce - Weather Bureau

2. Program for Entire Study - Estimate $124,000

Basic hydro-climatic data necessary for incorporation in the studies are available. Most of these data are in published form and a substantial amount are on punched cards. It is anticipated that the required data can be readily furnished. Two basic concepts for analyzing hydro-climatic data to provide a reliable guide for evaluating irrigation-water requirements and estimating the limits of precipitation deficiencies as development of land and water resources progresses have been investigated and the techniques found to be statistically feasible. High-speed electronic computer programs for these are now available.

(1) Irrigation-water requirements: Average monthly potential evaporation would be computed from meteorological factors of air temperature, dewpoint, solar radiation, and wind. From smooth curves fitted to these data, average daily values may be obtained. These values and current daily rainfall would be the basis of a simple soil moisture accounting procedure. Soil moisture accounting could be made for several root zone capacities, i.e., 1, 2, 3, and 4 inches. In day-to-day operations the efficiency of scheduled irrigation applications would be improved. In design the techniques could be readily adapted to determine water requirements for supplemental or full irrigation.

(2) Drought-frequency-intensity: It is proposed that the frequency distribution of low rainfall periods be analyzed. The results would be presented on maps indicating the limiting rainfall values for various probability levels. For example, the isopluvials on a given map might indicate a 5 per cent probability that July rainfall would be equal to or less than a specified amount.

3. Program to be Accomplished, FY 1966 - Estimate $32,000

Direct appropriations to the Weather Bureau were not made for Fiscal Year 1965 and the present status of Fiscal Year 1966 requests does not indicate direct appropriations. Unless this status is changed as a result of requests by the ad hoc Water Resources Council, it appears no work will be done. Some studies by Work Groups are contingent upon completion of these hydro-climatic studies.

4. Source of Funds: This is indefinite as indicated by (3) above.

September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. U. S. Department of Commerce - Office of Business Economics

2. Program of Entire Study

The Office of Business Economics entered into a reimbursable agreement with the Departments of the Army, Interior and HEW to compile, analyze and project social and economic data as related to population, income industry and similar economic parameters. This action is being complemented by studies of the Department of Agriculture. These studies are to be standardized for the entire nation; however, a high priority was assigned to the Missouri Basin Study.

3. Program to be Accomplished, FY 1966

Work programed andstarted in Fiscal Years 1964 and 1965 will be continued. Throughout the study in Fiscal Year 1966, special attention will be given to the immediate requirements of the Missouri Basin Study. Due to this, some phases will be essentially completed. Other phases, as related to coordination with the National study, may continue through Fiscal Year 1968.

4. Sources of Funds:

Work is financed on a reimbursable basis with allocations determined at the ad hoc Water Resource Council level.

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September 1, 1964

AGENCY JUSTIFICATION

MISSOURI RIVER BASIN

Comprehensive Framework Study of Water and Related Land Resources

1. Department of Labor - Bureau of Employment Security

2. Program for Entire Study - Estimate $96,000

Interest and purpose of Department of Labor participation: The Department of Labor was first assigned membership on the Missouri Basin Inter-Agency Committee in 1952 because a basic goal of the Department of Labor is the enhancement of employment opportunities and incomes among people of the Nation. The phenomenom of rapidly increasing agricultural productivity has created in the Missouri Basin extraordinary problems of job displacement and impact on the rural and urban economies. This is because the declining agricultural employment base of the Basin is relatively large and the extent of industrialization is relatively small. One result, national in effect, is the out-migration of Basin residents which adds to the unemployment problem. Reduced incomes are an additional depressing effect, both nationally as well as within the Basin.

The determination of optimum development of natural resources in the Missouri River Basin can be a most important step toward the achievement of adequate per capita income levels in the ten States of the Basin in the years ahead. Without such development this is by no means assured, based on the present economic outlook in the Basin.

Participation in the study will be through membership and chairmanship of appropriate task forces and work groups as has been the case in Fiscal Year 1964 and 1965.

Analysis of the Basic Economic Structure: The Department of Labor is participating in an intensive, original examination of basic, generative income sources and their relation to population and income aspects of the Basin. Using out-migration data as one indication of the Basin's inadequate economic support, the present industrial composition will be contrasted with requirements for a more adequate economy. Problems of the Basin's economy are being studied not only by industrial components, but also by hydrological or political subareas, as proves appropriate.

The Department would propose to aid in inter-project analysis where it is advisable to measure theeconomic and social value of water under alternative use assumptions. The ability of different natural resource developments to support a given economy and population level may be compared, particularly where water availability limits the ability to proceed with one or more projects contemplated.

Economic Projections: The size of the economic base in terms of employment and income structure for selected future years is being projected. This will be developed for separate industrial groups and for many geographic subareas. From the probable level of the economy the future population in the various sections of the Basin will be estimated. These population and industrial projections would, in turn, permit estimates of water volume requirements by natural resource agencies participating in the Comprehensive Plan.

The projections of size of the economy to be supported in future years would in part be derived from future trends in agriculture, mining, and manufacturing. As part of this translation, it may be necessary to construct two hypotheses on the future of the economy in many segments of the Basin. The first would assume minimum further development of River Basin projects and the second would be an attempt to determine the optimum natural resource development of the Nation and illustrate the size of the economy to be supported if the intensity of water development were maximized.

The projections of the size of the economy must particularly devote attention to the employment and income potential of such developing and newly emerging industries as recreation, personal services, education, electronics and chemurgy.

3. Program to be Accomplished, Fiscal Year 1966 - Estimate $20,000

The second full year devoted to preparation of the Comprehensive Plan should include completion of much of the basic analysis discussed under that heading in Item 2 above. One exception might be the participation in analysis of values among alternative Basin projects. This might await later preparation of plans and objectives by participating natural resource agencies.

4. Source of Funds:

Direct Appropriation: $20,000 for FY 1966

Funds required for future years of study:

FY 1967	$25,000
FY 1968	$20,000
FY 1969	$10,500

Chairman, Standing Committee
Comprehensive Basin Planning
Missouri Basin Inter-Agency Committee

COORDINATED COMPREHENSIVE RIVER BASIN PLANNING ESTIMATES, FISCAL YEAR 1966
September 1964

Missouri River Basin
Type 1

I	PROGRAM	METHOD OF FINANCING	TOTAL ESTIMATED COST	** TO JUNE 30 1964	FISCAL YEAR 1965	1966	1967	1968	1969	1970	BALANCE TO COMPLETE	ESTIMATED COMPLETION DATE
	Department of Agriculture - Total Program		1,500,000	85,000	210,000	341,000	393,000	330,000	141,000			
	Soil Conservation Service	Direct	(900,000)	(60,000)	(125,000)	(205,000)	(240,000)	(200,000)	(70,000)			1969
	Forest Service	Direct	(200,000)	(10,000)	(35,000)	(46,000)	(48,000)	(35,000)	(26,000)			1969
	Economic Research Service	Direct	(400,000)	(15,000)	(50,000)	(90,000)	(105,000)	(95,000)	(45,000)			1969
	Department of the Army - Total Program		1,763,000	134,000	250,000	400,000	400,000	300,000	279,000			
	Corps of Engineers	Direct	(1,763,000)	(134,000)	(250,000)	(400,000)	(400,000)	(300,000)	(279,000)			1969
	Department of the Interior - Total Program		1,850,000	104,500	343,500	513,000	386,000	383,000	120,000			
	Geological Survey	*	85,000		(15,000)	(35,000)	(25,000)	(10,000)				1968
	Indian Affairs	*	27,000		(7,000)	(10,000)	(5,000)	(5,000)				1968
	Land Management	*	45,000		(5,000)	(35,000)	(5,000)					1967
	Mines	*	60,000		(30,000)	(20,000)	(10,000)					1967
	Outdoor Recreation	*	73,000		(18,000)	(19,000)	(18,000)	(18,000)				1968
	Reclamation	Direct	1,500,000	(104,500)	(253,500)	(379,000)	(308,000)	(335,000)	(120,000)			1969
	Sport Fisheries & Wildlife	*	60,000		(15,000)	(15,000)	(15,000)	(15,000)				1968
	Department of Health, Education and Welfare - Total Program ***		430,000			100,000	130,000	100,000	100,000			
	Public Health Service	Direct	(430,000)			(100,000)	(130,000)	(100,000)	(100,000)			1969
	Four Department Total Program		5,543,000	323,500	803,500	1,354,000	1,309,000	1,113,000	640,000			
	Other Federal Agencies - Total Program		310,000	16,000	36,000	68,000	83,000	66,000	41,000			
	Federal Power Commission	Direct	(80,000)		(16,000)	(16,000)	(16,000)	(16,000)	(16,000)			1969
		Transfer from Army	(10,000)	(10,000)								
	Department of Commerce	Direct	(118,500)			(32,000)	(42,000)	(30,000)	(14,500)			1969
		Transfer from Army	(5,500)	(5,500)								
	Department of Labor	Direct	(95,500)		(20,000)	(20,000)	(25,000)	(20,000)	(10,500)			1969
		Transfer from Army	(500)	(500)								
	Total Program Including Other Federal Agencies		5,853,000	339,500	839,500	1,422,000	1,392,000	1,179,000	681,000			

* - Funds Included in Bureau of Reclamation, Construction and Rehabilitation, Missouri River Basin Project Investigation Funds Transferred to Other Interior Agencies.

** - Figures in this column for Agriculture are allotted; for Army are appropriations; for Interior are expenditures; and for other agencies are expenditures.

*** - These figures represent only the costs of providing the other agencies with water supply and water quality data.

Chairman, Standing Committee
Comprehensive Basin Planning
Missouri Basin Inter-Agency Committee

COORDINATED COMPREHENSIVE RIVER BASIN PLANNING ESTIMATES, FISCAL YEAR 1966
September 1964

Missouri River Basin
Type 1

II	APPROPRIATIONS REQUIRED, INCLUDING OTHER FEDERAL AGENCIES	METHOD OF FINANCING	TOTAL ESTIMATED COST	TO JUNE 30 1964	FISCAL YEAR 1965	1966	1967	1968	1969	1970	BALANCE TO COMPLETE	ESTIMATED COMPLETION DATE
	Total		5,853,000	354,400	837,500	1,422,000	1,392,000	1,179,000	681,000			
	Appropriations required by Four Departments Total		5,559,000	354,400	801,500	1,354,000	1,309,000	1,113,000	640,000			
	Department of Agriculture - Total		1,500,000	95,900	210,000	341,000	393,000	330,000	181,000			
	Soil Conservation Service		(900,000)	(60,600)	(125,000)	(205,000)	(240,000)	(200,000)	(70,000)			
	Forest Service		(200,000)	(10,300)	(35,000)	(46,000)	(48,000)	(35,000)	(26,000)			
	Economic Research Service		(400,000)	(25,000)	(50,000)	(90,000)	(105,000)	(95,000)	(85,000)			
	Department of Army - Total		1,739,000	150,000	250,000	400,000	400,000	300,000	239,000			
	Department of Interior - Total		1,850,000	108,500	341,500	513,000	386,000	383,000	120,000			
	Department of Health, Education and Welfare - Total		430,000			100,000	130,000	100,000	100,000			
	Other Federal Agencies - Total		294,000		36,000	68,000	83,000	66,000	41,000			
	Federal Power Commission		(80,000)		(16,000)	(16,000)	(16,000)	(16,000)	(16,000)			
	Department of Commerce		(118,500)			(32,000)	(42,000)	(30,000)	(14,500)			
	Department of Labor		(95,500)		(20,000)	(20,000)	(25,000)	(20,000)	(10,500)			

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MISSOURI BASIN INTER-AGENCY COMMITTEE

SUBCOMMITTEE ON COMPREHENSIVE BASIN PLANNING

Outline of Work
for
Missouri Basin
Comprehensive Basin Planning

The following Outline has been prepared by the Subcommittee on Comprehensive Basin Planning through five Work Groups to expand the approved general definition of scope which is as follows:

> "The Subcommittee considers that the Comprehensive Framework Plan for the Missouri Basin would consist of studies of an area that provide long-run economic projections of economic development, translation of such projections into demands for water and related land resource uses, hydrologic projections of water availability both as to quantity and quality, and projections of related land resource availability, so as to outline the characteristics of projected water and related land resource problems and the general approaches that appear appropriate for their solution."

January 1964 - Revised May 1964

As the studies made for the Comprehensive Framework Study of the Missouri Basin will be accomplished by individuals in many Agencies and States, it is considered that a card reference to such studies is essential for future reference. The attached Outline, the Outline of Work, revised May 1964, has been reproduced with file numbers referenced to the various parts of the Outline for use in the card reference file. Further information about the card reference system is included in a statement "Manualization of Card File Preparation" dated November 1964. For further information concerning the file system contact the Work Group Chairmen or Mr. Charles A. Cocks, Chairman of the Standing Committee.

December 1964

MISSOURI BASIN INTER-AGENCY COMMITTEE
SUBCOMMITTEE ON COMPREHENSIVE BASIN PLANNING

Outline of Work
for
Missouri Basin
Comprehensive Basin Planning

INTRODUCTION

When the Subcommittee received its instruction to prepare a detailed outline of work to be accomplished under the comprehensive study, it chose to take the brief definition of scope, quoted on the front cover, and prepare an outline for each of the five major parts thereof. Thus, the following outline has been divided into five parts, as follows:

Part I	Economic Base Study
Part II	Determination of Land and Water Needs
Part III	Hydrologic Analyses and Projections
Part IV	Land Resource Availability
Part V	Water and Related Resource Development

In general, the detailed Outline of Work is an attempt to indicate those things which must be given consideration during the course of the study. It is recognized that during the study other items may come up which would require modification or expansion of the Outline. An attempt has been made to clarify the degree of detail of work to be undertaken as the previous Outline may not have had sufficient discussions and the terms used may not have been definitive enough to give an adequate description of work anticipated for the study, leading to conclusions of excessive detail.

The Comprehensive Framework Plan for the Missouri River Basin will be in conformance with existing laws (Federal and State) and compacts. It is recognized that existing laws and compacts and departmental policy may not always allow optimum development. In these instances the plans shall present a proposed program under existing laws and, as an alternate, a proposed program which might proceed with changes in law and departmental policy, carefully delineating the extent of the change in law or policy required for the most optimum development.

The attached Outline provides guidance for undertaking the planning in connection with the Comprehensive Framework Study of the Missouri River Basin. During the course of the Study, if it appears appropriate that there should be a material modification of the items in the Outline, the scope or indicated detail of the study, such matters will be brought to the attention of the Missouri Basin Inter-Agency for consideration and further guidance before the studies on these new items or new scope are undertaken.

Subsequent to the preparation of the Outline, the Interdepartmental Staff Committee in Washington prepared "Guidelines for Framework Studies." As the Outline, in some instances, indicates a degree of detail that might be in excess of that indicated in the Guidelines, the Outline has been modified to indicate a lesser degree of detail in several instances.

A copy of the Guidelines is attached hereto and is intended to place the constraints indicated therein as limitation on details of the study.

The framework type comprehensive study will require, if carried out in an economical way, that considered judgment of experienced planners, together with general studies and reasoned approximations, be utilized extensively in lieu of detailed and expensive studies. These conditions must be recognized, not only by those directly involved, but by those who utilize the study in the future.

GUIDELINES FOR FRAMEWORK STUDIES

Prepared by Interdepartmental Staff Committee

"1. The basic objective in the formulation of framework plans is to provide a broad guide to the best use, or combination of uses of water and related land resources of a region to meet foreseeable short-and long-term needs. In studies to achieve this basic objective consideration will be given to (a) the timely development and management of these resources as essential aids to the economic development and growth of each region; (b) the preservation of resources, in appropriate instances, to insure that they will be available for their best use as needed; and (c) the well being of all of the people as the overriding determinant in such planning.

"2. Framework studies will be preliminary or reconnaissance type investigations intended to: (a) provide broad-scaled analyses of water and related land resource problems and (b) furnish general appraisals of the probable nature, extent, and timing of measures for their solutions.

"3. Framework studies will be concerned only with the intra-regional water and related land resources and their uses except that where natural inter-regional hydrologic connections are involved, as in the case of the Missouri basin and the lower Mississippi River, the inter-regional aspects may be considered.

"4. Framework studies will consider all geographic areas within the study region and all purposes served by the conservation, development and use of water and related land resources. The details of framework studies will be limited to those necessary to meet the requirements of item 2 above within the ceilings of total study costs established by the Interdepartmental Staff Committee. ***

"5. To meet the requirements of scope and detail established in item 4 above, framework plans will be based on initial planning steps using general relations, reasoned approximations, available data, and the judgment of experienced planners. While potential sites may be identified, project formulation studies will not be undertaken at any stage of framework planning. It is not contemplated that inventories of all potential sites will be made. New procedures and concepts, as well as the ingenuity of the planners, will be required.

"6. The economic projections for framework studies will be for the region as a whole and for appropriate subregions. The need for a national patterns of indices and projections to establish the economic relationships between regions is recognized and consideration is being given to its accomplishment at Department level.

"7. In framework studies, the study area will be broken into subregions defined as hydrologically consistent areas, such as principal (5,000 to 50,000 sq. mi. or more) sub-basins; and major problem areas, such as a major (for example, Indianapolis) metropolitan area or a major (several tens-of-thousand square miles) water deficient area. It is recognized that the definition of these areas must be tailored in size and number to the specific study region but it is intended that the number of such areas be kept to a practical minimum consistent with the basic objective of the framework study (item 2) and the anticipated needs for future more detailed sub-basin studies.

"8. The needs for the goods and services relevant to water and related land resource development will be expressed in terms of gross and net demands for such goods and services in each subregion (item 7.) The net demands to be met by additional resource development will reflect adjustments for unused capacities of existing resources and/or competitive means of satisfying part or all of the gross demands. These net demands will be shown for current conditions of development and for 1980, 2000,and 2020.

"9. Framework studies will establish the water resource relationship between logical sub-regions of the study area. Inter-regional water relationships will not be investigated in framework studies except as noted in item 3.

"10. Water problems along downstream reaches of major rivers, such as the Ohio and the Missouri, usually are susceptible to broad resolution only after consideration of control of high and low flows in tributary areas. Accordingly, a framework study will require that the main stem problems be considered in connection with intra-sub-basin problems.

"11. Framework plans will be defined in terms of (a) gross storage requirements, with time and general geographic distributions; (b) local protection works, with the indicated number of localities involved in each subregion; (c) general reaches (20 to 50 miles) where increased low flows and/or decreased pollution loads are indicated for water quality improvements at target dates in the future; (d) management and utilization of "related land" by acres, or square miles involved, with time and geographic patterns indicated; (f) man-days of water based recreation, including hunting and fishing, to be provided with time and general geographic patterns; and (g) similar general terms for other functions of water and related lands.

"12. The practicality of broad components of the frameworks and physical and hydrologic factors pertinent thereto will be established through general reviews and assessments of water supplies, storage potentials, related land resources, local protection possibilities, and other physical factors and through general appraisals of the reasonableness and effectiveness of potential programs of water reclamation and reuse, flood plain zoning, and other similar measures.

"13. General cost estimates for broad components of the framework plan will be of reconnaissance quality and detail, based primarily on experience in the study region.

"14. In developing the framework plans (item 11) the intraregional potentials for changes in resource uses, reallocation of existing storage, and similar matters will be reviewed in general terms.

"15. In framework studies "related land" is that land on which present or projected use or management practices cause significant effects on the quantity and/or quality of the water resource, and that land the use or management of which is significantly affected by or depends on existing and proposed measures for management, development or use of water resources.

"16. Framework studies will project, for target years, land use patterns to the extent necessary to appraise in general terms the needs for water resource development and the effects of land use on projected water resources availability, management and development.

"17. Framework studies will reach conclusions as to the urgency of water and related land problems in the subregions and recommended priorities for more detailed studies in the near future (10 to 15 years) leading to the authorization of an action program for the development of the water and related land resources."

MISSOURI BASIN INTER-AGENCY COMMITTEE
SUBCOMMITTEE ON COMPREHENSIVE BASIN PLANNING

Outline of Work
for
Missouri Basin
Comprehensive Basin Planning

Part I

File No.

1.000 **Economic Base Study**

The following outline indicates work contemplated for assembly of data and information for the Economic Base Study and report. Much of this material will be accomplished as a part of the national study being conducted by the Office of Business Economics, Department of Commerce, and by the Department of Agriculture. As specific information on the scope of these national studies is determined the supplemental work necessary will be delineated.

1.1 I. Description of the Basin
Brief discussion of physical and geographic aspects, natural resources, history and settlement, and development and organization of the economy, including its relationship to the national economy as background for this phase of the study.

1.2 II. The People

1.2A A. Characteristics of the Population
Analysis of the make-up and distribution of the population, including appraisal of significant recent changes and trends.

1.2A1 1. Standard metropolitan statistical areas
1.2A2 2. Urban
1.2A3 3. Rural, farm and nonfarm

1.2B B. Characteristics of the Labor Force

1.2B1 1. Employment
Present by appropriate areas and significant industries for needed years to show trends. Present labor force participation data, including pertinent aspects of unemployment and underemployment.

1.2B2 2. Wages and Income
Personal income by states and subareas, by industrial origin.

1.3 III. Status of Water Resources Development
(To be furnished by parent subcommittee)

1.3A A. Existing Private and Public Projects
Brief discussion and documentation of all Federal and major State and private projects and programs that have been and are being developed, with evaluation of principal land and water use and control functions.

1.3B B. Programs and Projects to be Developed
Appraisal of effects and impacts on water use functions of projects authorized or assumed to be developed in the future. (Needed early from other sources.)

1.4 IV. Agriculture in the Basin's Economy
(In this section, agriculture will be examined as to its probable contribution to the support of employment and population in the basin, both on farms and as an economic base for the off-farm economy. The conclusions reached in connection with the following subsections will be derived from data included in other Chapters of the Outline.)

1.4A A. Characteristics of the Agricultural Economy
Analysis of the present agricultural economy of the basin, agricultural use of land and water, and output of agricultural products.

1.4B B. Inventory of the Resource Base and Its Use
An inventory and classification of land and water potentially available in the basin, for agricultural use or more intensive use.

1.4C C. Production Practices and Costs
Analysis of production practices and costs for major crop enterprises and projection of impact of technological development on production practices and performance rates.

1.4D D. Production Technology
An appraisal of future crop and pasture yields based on the development and application of improved production technology, further application and improvement of soil and water conservation practices, and expected intensification of production practices.

1.4E E. Productive Capacity of Basin
Evaluation of capacity of the basin; and additional output obtainable from alternative sources, within given ranges of unit cost of production.

1.4F F. Impact of Development on Agricultural Activity and Employment
Appraisal of additions to or improvement in the resource base-modified patterns of use, costs of agricultural production, marginal costs, total outlay of economic resources required to satisfy agricultural product needs, and relationship to employment opportunities.

1.4G G. Projected Needs for Products of the Land

1.4G1 1. Projections of future national requirements for agricultural products based on assumed population growth, GNP, per capita income, consumer preferences, and agricultural imports and exports.

1.4G2 2. Allocation of future requirements to the Missouri Basin based on expected shifts between regions, considering production shifts, marketing costs, quality of products, and availability of resources for agricultural purposes.

1.5 V. The Basin's Mineral and Fuel Resources

1.5A A. Review of past and present developments including the principal minerals, in terms of volume and value of output.

1.5B B. Availability and Volume of the Resources
Include metallic, nonmetallic, and fuel resources with appraisal of marginal resources and those of higher quality and competitive in national markets.

1.5C C. Potential Development and Outlook for Mineral and Fuel Resources
Review of probable development of mineral and fuel resources by type, volume of production, and location: such as, cement and sand and gravel which will depend on local markets for development; of fossil fuels available for production of electric power and potential chemical industry; and other minerals which will depend on national markets.

1.5D D. Technological Mining Changes and Their Effect on Population, Employment, and Income
Evaluation of projected developments on population, employment, and income, taking into account technological changes.

1.6 VI. Past and Present Pattern of Industrial Organization

1.6A A. Makeup of Existing Industry and Growth

1.6A1 1. Manufacturing trends
Include value added data, output, sales, and capital expenditure sources as a basis for analysis.

1.6A2 2. Industrial Production
Heavy water using industries
(Obtain production figures for industries in tons or other available units of measure-determine trends)

1.6A2a a. Paper and Allied Products
1.6A2b b. Chemicals and Allied Products
1.6A2c c. Petroleum Refining
1.6A2d d. Primary Metals
1.6A2e e. Food and Kindred Products

1.6A3 3. Construction Impact on Economy
Search and summarize existing studies for instances of stimulation of economy from construction impact.

1.6B B. Location Factors Pertinent to Economic and Population Projections

1.6B1 1. Proximity to markets
1.6B2 2. Availability of labor
1.6B3 3. Transportation of facilities
1.6B4 4. Availability of raw material
1.6B5 5. Availability of fuel and power
1.6B6 6. Other important location factors

1.6C C. Industrial Concentration in Urban Areas or Decentralization of Industry

1.6C1 1. Trends toward industrial concentration
1.6C2 2. Trends toward industrial decentralization

1.7 VII. Importance of Trade, Finance, and Services in Basin's Economy

1.7A A. Review of Growth in These Sectors in Relation to Materials Producing or Basic Industries
Develop trend indicators from employment and sales receipt data and compare with growth rates with agriculture, mining and manufacturing. Analyze trends in agri-business activities by subareas.

1.7B B. Principal Distribution and Financial Centers
Show importance of these industries in principal cities and S.M.S.A.'s with employment, wholesale trade, and banking activities volume as indicators. Compare with importance to rest of Nation.

1.7C C. Effect of Parks, Public and Private Land, and Water Development on Recreation and Tourism
Appraisal of such effects. Statistical documentation on visitation and use of parks, forests, lakes and reservoirs. Description of impact on trade and services.

1.7D D. Significance of Hunting and Fishing and Development of Those Resources on Trade and Services

Appraisal parallel to that stated under "C" above.

1.7E E. Employment Trends in Other Categories
Develop data on employment by metropolitan and other areas. Develop trend line.

1.8 VIII. Social Changes and Their Effect

1.8A A. Decline in Rural Population, Out-migration, and Rapid Growth of Urban Areas
Analysis of historic and present trends in agricultural productivity and its attendant release of workers to nonagricultural pursuits; develop data on migration in the basin States. Analyze the rapid growth of major metropolitan centers, as well as the tendency for many rural towns to become smaller and larger towns to grow.

1.8B B. Increased Personal Income, Mobility of Population and Leisure Time
Review of rising real personal income, expansion of travel, reduction in working hours, and impact of these factors on society.

1.8C C. Associated Pattern of Employment
Review of rapidly rising employment in service industries with special emphasis on those affected mostly, such as education, tourism, and all forms of recreation.

1.9 IX. Economic Projections - 1980,2000,2020, by Geographic or Hydrologic Regions or Groups of Counties
(See appropriate historic sections.)

1.9A A. Projected Population

1.9A1 1. Use National, State, Regional and Local projections of employment as basis for making projections of population. Adopt statistical method such as linear or curvilinear regression or other methods for projecting urban and rural components. Apply such techniques and review and modify results as may be warranted by probable or projected industrial or economic development and relate basin projections to National projections.

1.9A2 2. S.M.S.A. - Review of appropriate Senate Select Committee on Water Resources and other available projections; studies of local and metropolitan planning groups and past population trends; adoption of methods for making projections; and making projections for all metropolitan areas in basin.

1.9B B. Projected Pattern of Employment and Wages
Prepare projections of these economic series for future dates as required by the Comprehensive Plan. Include classification by county or other geographic areas as well as industrial detail to the extent needed for analysis in the report.

1.9C C. Projected Units of Production in the Basic Industries, Agriculture, Mining, and Manufacturing (heavy water using industries)
Projections of industrial volumes as a basis for developing employment and population trends

1.9D D. Projected Income
(for geographic or hydrologic areas.)

1.9D1 1. Personal income
1.9D2 2. Income per capita
1.9D3 3. Income distribution

1.10 X. Summary and Conclusions

1.11 XI. Impact of Development of Comprehensive Program on the Economy of the Area.
To be developed subsequent to outline of plan

MISSOURI BASIN INTER-AGENCY COMMITTEE
SUBCOMMITTEE ON COMPREHENSIVE BASIN PLANNING

Part II

2.000 Determination of Land and Water Needs

2.1 I. Municipalities and Industries Water Requirements

2.1A A. Municipal Water Supply
(Population projections for 1980,2000, and 2020 will be by the Economic Base Study)

2.1A1 1. Estimation of per capita consumption

2.1A1a a. Current and past trends - locality and sub-basins
2.1A1b b. Future (1980-2000-2020) by sub-basin

2.1A2 2. Determination of adequacy of current supply
(Quality and quantity)

2.1A3 3. Additional needs

2.1A3a a. Current by locality and sub-basin
2.1A3b b. Future (1980-2000-2020) by sub-basin areas

2.1B B. Industrial Water
(Information on projected industries (kind and size) will be provided by the Economic Base Study)

2.1B1 1. Estimation of consumption by unit of production

2.1B1a a. Current - industry type
2.1B1b b. Future (1980-2000-2020) - by industry type

2.1B2 2. Determination of adequacy of current supply (quality and quantity) by industry

2.1B3 3. Additional needs

2.1B3a a. Current - by locality and sub-basins
2.1B3b b. Future (1980-2000-2020) - by sub-basin areas

2.1C C. Pollution Abatement needs
(Population projections by municipalities will be provided by Economic Base Study)

2.1C1 1. Existing Situation

2.1C2 2. Required treatment facilities

2.1C2a a. Current by specific localities
2.1C2b b. Future (1980-2000-2020) - by specific localities or sub-basin areas.

2.1D D. Water Quality Needs

2.1D1 1. Establishment of water quality criteria
(In cooperation with other sections)

2.1D2 2. Storage for low flow regulation needs

2.1D2a a. Current by stream reaches
2.1D2b b. Future (1980-2000-2020) by reaches or sub-basin areas

2.2 II. Agriculture

2.2A A. Inventory of Existing Situation

2.2A1 1. Inventory of present land use.
(Acreage data to be provided as set forth in Land Resource Outline)

2.2A2 2. Determination of present production

2.2A2a a. Crops and forest products
2.2A2b b. Livestock and livestock products

2.2A3 3. Problems

2.2A3a a. Surplus from area contributing to National surplus
2.2A3b b. Shortages existing in area

2.2B B. Broad analysis of Agriculture Production Capacity Without Future Development of Water Resources

2.2B1 1. Land resources by irrigated and nonirrigated land resource increments

2.2B2 2. Projected crop yields by irrigated and nonirrigated land increments

2.2B3 3. Projected production costs by irrigated and nonirrigated land increments.

2.2B4 4. Projected production from the basin's land resources by products and evaluate the production capacity in terms of unit cost of production

2.2B5 5. Define needs for changes in patterns of land use

2.2B6 6. Compare projected production from the land with projected needs by products and express shortages or surpluses in terms of volume of product and acres.
(In coordination with land development works)

2.2C C. Effect of Technological Improvements by years 1980-2000-2020

2.2C1 1. Effect on production of crops and forest yields
2.2C2 2. Effects on labor requirements, and machinery
2.2C3 3. Effects on number and size of farms

2.2D D. Projected Needs of Agriculture Products
Agricultural production needs expressed in terms of physical quantities of crops and forest products and livestock and livestock products

2.2E E. Opportunities for Agriculture Related to Development of the Water Resources
Water and related land resources requirements, to satisfy or meet projected production needs including land use conversion, irrigation, drainage, and flood protection.

2.2F F. Determination of Potential Production Increases
By production cost increments associated with land use conversion, irrigation, drainage, and flood protection.

2.2G G. Appraisal of Livestock and Rural Domestic Water Requirements

2.2G1 1. Develop current and projected rates of per capita and livestock water use

2.2G2 2. Appraise current agricultural and rural community water use and projected water requirement

2.2G3 3. To the extent information permits evaluate surface water requirements as contrasted to available underground water sources

2.3 III. Flood Control and Prevention

2.3A A. Flood Control or Prevention Needs

2.3A1 1. Extent of Basin area involved in studies of flood control needs

2.3A2 2. Determination of flood problem areas

2.3A2a a. Review of existing flood control projects (including completed, under construction and authorized projects and including both single-purpose flood control projects and the flood control function of multiple purpose projects)

2.3A2a1 (1) Preparation of summary of existing flood control projects, Federal and non-Federal

2.3A2a2 (2) Evaluation of adequacy of flood control provided in the areas affected by existing flood control projects

2.3A2b b. Evaluation of flood problems in areas currently without any flood protection

2.3A2b1 (1) Summarization and review of available data on flood damages

2.3A2b2 (2) Comparison of stream channel capacities with stream discharge frequency data from data prepared under Hydrologic portion.

2.3A2b3 (3) Preliminary designation of flood problem areas on the basis of studies described in items (1) and (2), above, for localities, stream reaches, or upstream watersheds as appropriate.

2.3A2b4 (4) Appraisal of flood problems under current and future conditions

2.3A3 3. Summarization of data concerning flood control needs as a basis for development studies

2.3A3a a. Concerning areas where existing flood protection might be supplemented.

2.3A3b b. Concerning areas currently without flood protection where flood protection appears warranted.

2.3B B. Bank Erosion Control Needs

2.3B1 1. Determination of bank erosion problem areas

2.3B1a a. Review of existing projects for bank erosion control

2.3B1a1 (1) Preparation of summary of existing projects

2.3B1a2 (2) Analyze adequacy of existing projects with regard to performance of intended function

2.3B1a3 (3) Formulation of conclusions concerning adequacy of existing projects with regard to areas affected

2.3B1a4 (4) Evaluation of needs concerning desirable modification of existing projects

2.3B1b b. Evaluation of bank erosion problems in areas currently without bank protection

2.3B1b1 (1) Summarization of available data on bank erosion problems under current and future conditions

2.3B2 2. Summarization of data concerning bank erosion control needs as a basis for development studies.

2.4 IV. Navigation

2.4A A. Navigation Needs

2.4A1 1. Determination of commercial navigation needs (Makeup and volume of commerce from Economic Base Study)

2.4A1a a. Appraisal of existing project on the Missouri River, Sioux City to the mouth.

2.4A1a1 (1) Preparation of summary of existing project

2.4A1a2 (2) Review of previous estimates of future use, on the basis of future economic growth indicated by the Economic Base Study

2.4A1a3 (3) Evaluation of adequacy of the existing project.

2.4A1b b. Determination of potential additional commercial navigation needs for consideration in connection with development of a comprehensive framework plan including consideration of desirability of slackwater navigation on the Missouri River, Yankton to the Mouth. (It is anticipated that such determination will be based primarily on review of the results of past studies, other data readily available, and review of the economic base studies.)

2.4A1c c. Evaluation of the need for additional commercial navigation projects

2.4A1d d. Summarization of data concerning commercial navigation needs as a basis for development studies.

2.5 V. Electric Power

2.5A A. Electric Power Requirements and Supply (Current)

2.5A1 1. Requirements (by market areas and appropriate subareas)

2.5A1a a. Peak - kw
2.5A1b b. Energy - kwh

2.5A2 2. Supply (by market areas and appropriate subareas)

2.5A2a a. Hydro - kw - kwh
2.5A2b b. Steam - kw
2.5A2c c. Other - kw
2.5A2d d. Total - kw

2.5A3 3. Interchange of supply

2.5A3a a. Exports - kwh - kw
2.5A3b b. Imports - kwh - kw
2.5A3c c. Net exports - kwh - kw

2.5B B. Estimated electric power requirements and supply 1980,2000, and 2020

2.5B1 1. Requirements (by market area and appropriate subareas)

2.5B1a a. Peak - kw
2.5B1b b. Energy - kwh

2.5B2 2. Supply (by market areas and appropriate subareas)

2.5B2a a. Hydro - kw - kwh
2.5B2b b. Steam - kw
2.5B2c c. Other - kw
2.5B2d d. Total - kw

2.5B3 3. Interchange of Supply

2.5B3a a. Exports - kwh - kw
2.5B3b b. Imports - kwh - kw
2.5B3c c. Net exports - kwh - kw

2.5C C. Water Requirements for Steam-Electric Generation

2.6 VI. Fish and Wildlife Studies

2.6A A. Current status of resources and programs

2.6A1 1. Inventory of fish and wildlife resources and habitat. Emphasis will be given to resources and habitat which could be benefited as part of a plan for development of water and related land resources. Basic information will acquired on.

2.6A1a a. Land use (Fish and Wildlife areas to be inventoried by others

2.6A1b b. Distribution and status of important fish and wildlife species (sport and commercial)

2.6A1c c. Fish and wildlife habitat types (broad categories)

2.6A1d d. Fish and wildlife lake and stream classification

2.6A1e e. Hunting and fishing pressures and trends

2.6A1f f. Existing fish and wildlife areas (Fish and Wildlife areas by public and private to be inventoried under Land Resources Section)

2.6A1g g. Water usage

2.6B B. Needs

2.6B1 1. Determination of future needs for fishing and hunting recreation

2.6B2 2. Determination of needs for development of commercial fisheries

2.6C C. Opportunities for Development

2.6C1 1. Review of existing Missouri River Basin projects to identify fish and wildlife conservation and development opportunities

2.6C2 2. Review of near future water resource development program proposed to determine opportunities for meeting needs.

2.6C3 3. Coordination of fish and wildlife planning with the broad plans for other purposes.

2.6C4 4. General studies of potential single-purpose fish and wildlife developments, both sport and commercial

2.6C5 5. Changes in land use required

2.6C6 6. Water needs

2.7 VII. Recreation

2.7A A. Current Status of Existing Recreational Facilities

2.7A1 1. Inventory of existing recreational facilities

2.7A1a a. Amount of recreational area by type of facilities; that is, water, forest, park, scenic, historical, etc. (Recreational land area by public and private to be provided under Land Resources Chapter)

2.7A1b b. Extent of present use by:

2.7A1b1 (1) Local residents (define)
2.7A1b2 (2) In-Basin Residents
2.7A1b3 (3) Out-of-Basin Residents

2.7A2 2. Adequacy of existing programs and facilities

2.7A2a a. Existing public and private recreational programs

2.7A2b b. Trends in recreational programs and adequacy of present programs and facilities in meeting current needs

2.7A2c c. Water usage

2.7B B. Estimation of Future Recreational Needs

2.7B1 1. Analysis of factors influencing needs (Basic data will be provided by Economic Base Study)

2.7B2 2. Determination of need of water oriented facilities

2.7C C. Opportunities for Development

2.7C1 1. Existing projects and facilities

Identify development opportunities which could be accomplished and would meet some of the needs considered in Item B above

2.7C2 2. Coordination with proposed multi-purpose water resource development which could provide opportunities to meet recreational needs.

2.7C3 3. Amount of water needed for recreation needs.

2.7C3a a. Initial or diversion
2.7C3b b. Surface area

2.7C4 4. Type and amount of land required for recreation needs.

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Part III

3.000 Hydrologic Analyses and Projections

3.1 I. Inventory of Hydrologic Data

3.1A A. Streamflow Records

3.1B B. Groundwater

3.1C C. Water Quality

3.1D D. Sediment

3.1E E. Infiltration

3.1F F. Climatological

3.2 II. Processing, Analysis, and Interpretation of Basic Hydrologic Data

3.2A A. Streamflow

3.2A1 1. Select stations for analysis

3.2A2 2. Obtain electronic computer tapes of daily flows for period of record at selected stations, and using computer to:

3.2A2a a. Tabulate monthly and annual volumes

3.2A2b b. Tabulate flow duration table of daily discharges and draw flow duration curves for key stations

3.2A2c c. Tabulate highest mean discharge (or flow volume) for various durations and prepare high flow volume probability curves for each station

3.2A2d d. Tabulate lowest mean discharge (or flow volume) for various durations and prepare low flow volume probability curves for each station.

3.2A2e e. Prepare flood peak probability curves for each station.

3.2A3 3. Run "bench-mark" study to be used in adjusting computed duration and probability curves to common time period.

3.2B B. Groundwater

3.2B1 1. General availability of groundwater
(A generalized descriptive statement covering occurrence throughout the basin.)

3.2B2 2. Description of principal known aquifers.

3.2B3 3. Utilization of groundwater
(Summarize volume of use for period of record by States or appropriate subdivisions.)

3.2B4 4. Potentials for increased utilization of groundwater.

3.2B5 5. Areas of over-development and problems associated therewith.

3.2B6 6. Summary of known groundwater recharge activities in basin.

3.2B7 7. Relationship between groundwater and surface water.

3.2C C. Water Quality - Surface and Groundwater

3.2C1 1. Suitability for domestic supplies

3.2C1a a. Bacterial quality
3.2C1b b. Physical characteristics
3.2C1c c. Chemical characteristics
3.2C1d d. Other substance, pH, alkalinity, etc.

3.2C2 2. Suitability for industrial water supplies

3.2C2a a. Chemical characteristics
3.2C2b b. Physical characteristics
3.2C2c c. Micro-organisms, organic matter
3.2C2d d. Other substance, pH, hardness, etc.

3.2C3 3. Suitability for irrigation use

3.2C3a a. Total concentrations of dissolved constituents
3.2C3b b. Sodium concentration (SAR)
3.2C3c c. Toxic elements
3.2C3d d. Bicarbonate content

3.2C4 4. Suitability for low flow regulation

3.2C4a a. Oxygen
3.2C4b b. Inorganic Compounds
3.2C4c c. BOD

3.2C5 5. Suitability for recreation and fish and wildlife

3.2D D. Sediment

Tabulate monthly and annual suspended sediment loads for period of record, compute averages, and present data on a map of estimated sediment production rate, and discuss bed load estimates.

3.2E E. Infiltration

Develop runoff indices and minimum infiltration rates and prepare generalized map of infiltration indices.

3.2F F. Climatological

(Present summary information on maps if appropriate)

3.2F1 1. Rain

(Including drought-duration-probability study)

3.2F2 2. Snow

Tabulate April 1 mountain snow survey data for all stations for period of record and determine averages.

3.2F3 3. Evaporation

Tabulate monthly and annual evaporation amounts for period of record for all stations in and adjacent to basin and determine averages.

3.2F4 4. Evapo-transpiration

Present such test data as are available and prepare maps showing potential evapo-transpiration for basin.

3.2F5 5. Temperatures

3.3 III. Modification of Actual Streamflow Records

Because much of the available data has been worked up on the 1949 level of basin development it is suggested that the balance of the stations selected under II A 1 for which streamflows have been significantly affected by land or water resource developments be modified accordingly.

3.4 IV Adjustment of Hydrologic Data to Reflect Current * Level of Basin Development

3.4A A. Streamflow

3.4A1 1. Estimate the monthly effects of all land and water resource projects which are expected to be existing or under construction currently, and use these effects to adjust the monthly and annual flow tabulations for all stations to current conditions. Prepare new tabulations for this condition.

3.4A2 2. Adjust computed flow-duration, volume-probability, and flood peak-probability curves and similar data to common period of record.

3.4B B. Water Quality

Consider effects of current projects on water quality. Discuss qualitative effects for beneficial uses.

3.4C C. Groundwater

Outline areas of prospective over-development and those for which additional supplies can be developed to meet anticipated requirements.

3.4D D. Sediment

Discuss effects of current projects on sediment loads tabulated under II D.

3.4E E. Climatological

Discuss overall effects of weather modification, evaporation reduction films, and evapo-transpiration reduction.

3.5 V. Development of Regionalized Generalization Procedures for Estimating Hydrologic Information for Areas for which Little or No Data are Available

3.5A A. Streamflow volume probability estimates

3.5B B. Water Quality

3.5C C. Groundwater

3.5D D. Sediment

3.6 VI. Hydrologic Data Projections

When plans or needs for the land and water resource developments for the years 1980, 2000, and 2020 are completed, additional hydrologic studies may be necessary to evaluate the adequacy of the water supply for accomplishing these developments and to estimate the remaining water supply.

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Part IV

4.000 Land Resource Availability

SCOPE OF STUDY

To develop an outline for accomplishment of work involved in carrying out an analysis of existing land resources and their current use, and projecting the availability and adaptability of the land to future alternative requirements. The acreage data will be assembled for each state and major sub-basin drainages.

4.1 I. Analysis of Existing Land Uses

4.1A A. Agricultural land

Agricultural land is all lands used for agricultural purposes including Federal and State lands leased or used by permit. Land used for agricultural purpose but where the primary purpose is military, recreation, wildlife, etc., will be included in their respective uses below and the amounts identified by footnotes. Agricultural lands will be inventoried by land resources areas into classes which will indicate its capabilities and limitations.

4.1A1 1. Cropland

Croplands are those lands currently tilled including areas planted whether or not harvested, fallowed, idled, seeded to cover or soil improvement crops not harvested or pastured, rotation pasture, and being prepared for crops or newly seeded crops. It includes land in vegetables and fruits including those grown on farms for home use. All tame hay is included as cropland. Wild hay is excluded.

4.1A1a a. Irrigated
4.1A1b b. Non-irrigated

4.1A2 2. Pasture and Range

Pasture and range is all land in grass and long term forage growth that is used primarily for grazing or the production of wild hay but excluding land in pasture or hay in a crop rotation. Lands in forest and woodlands or any other primary purpose which is grazed will be included with the amount identified by footnote.

4.1A2a a. Irrigated
4.1A2b b. Non-irrigated

4.1A3 3. Forest and woodland

Forest and woodlands are lands which are at least 10 percent stocked by forest trees of any size and capable of producing timber or wood products, land from which the trees have been removed to less than 10 percent stocking and which have not been developed for another use, and afforested areas. Forest and woodland set aside for special uses other than timber production, such as state parks, monuments, natural areas and game preserves, will be included with amounts in such uses footnoted.

4.1A4 4. Other Land

Other land includes all other agricultural land not classified as cropland, pasture and range, or forest or woodland.

4.1A4a a. On farms

Other lands in farms include farmsteads, feedlots, farm lanes, idle or waste land, wildlife areas and other areas classified as farm land but not classified as cropland, pasture and range, or forest and woodland.

4.1A4b b. Not in farms

Other land not in farms includes sites of crossroad filling stations, rural non-farm residences, country churches; cemeteries, and school grounds, except where any of these occur in built-up areas of 10 acres or more, as well as tracts of any size of open, idle, rural non-farm land.

4.1B B. Recreation Areas

Public and Private

All land used primarily for recreation. Areas on which recreation purpose or installation authority is secondary will be cited as to primary use, with secondary uses noted.

4.1C C. Fish and Wildlife Areas

Public and Private

All land used primarily for fish and wildlife. Areas whose primary purpose or installation authority is some other use will be cited as to primary use with secondary uses noted.

4.1D D. Transportation, Urban and Built-up Areas

This would include areas for public roads, railroads and airports; urban and built-up areas include cities, villages and other built-up areas, industrial sites, railroad yards, cemeteries; golf courses; shooting ranges, etc; and institutional and public administrative sites and similar types of areas.

4.1E E. Natural Water Areas
Includes areas in natural lakes and perennial streams.

4.1F F. Water Resource Developments
(Excluding recreation and fish and wildlife developments)
Dams and reservoirs include lands occupied by the structure and surface area of pools which cannot be put to other uses. Levees include only land occupied by the structure and areas required for project installation and which cannot be put to another use. Temporary inundation areas are those areas above the planned or natural water surface which is inundated frequently enough to preclude any other primary use, but may or may not support a secondary use. Waste control includes all areas required for sewage treatment, such as lagoons, land fills, etc.

4.1G G. Mineral Industry
Includes all lands required for surface and underground mining operations, oil and natural gas production, mineral beneficiation and processing plants, mine and process waste disposal, pipelines, and other miscellaneous industry uses.

4.1H H. Military Installation
Includes all lands under military supervision or ownership with land used for other purposes such as housing, crop production, grazing, etc. footnoted.

4.2 II. Analysis of Land Available and Adaptable to Alternate Beneficial Uses
(See definitions of items under I)
The analysis will include land which, to meet the demands for goods and services, can be improved, or diverted to other uses. It also includes analysis of lands which are not capable of sustaining present use and should be diverted to a less intensive use. Estimates of acreage involved will be made by subbasin.

Examples of these possible changes in land use include:
Non-irrigated cropland suitable for irrigation.

Irrigated pasture and range suitable for cropland.

Cropland of low capability which should be converted to pasture and range, or forest and woodland.

Land suitable for additional uses not adversely affecting necessary present or future primary uses.

Areas suitable for reservoir sites.

Areas of especial value for recreation and/or wildlife developments.

Areas that should be preserved to insure availability of their mineral resources when needed.

Areas of unique beauty, historical and scientific interest which should be maintained primarily for the inspiration, enjoyment and education of the people.

4.2A A. Agricultural land

4.2A1 1. Cropland

4.2A1a a. Irrigated
4.2A1b b. Non-irrigated

4.2A2 2. Pasture and Range

4.2A2a a. Irrigated
4.2A2b b. Non-irrigated

4.2A3 3. Forest and Woodland

4.2A4 4. Other Land

4.2A4a a. On farms
4.2A4b b. Non in farms

4.2B B. Recreation Areas
Public and private

4.2C C. Fish and Wildlife Areas
Public and private

4.2D D. Transportation, Urban and Built-up Areas

4.2E E. Natural Water Areas

4.2F F. Water Resource Developments

4.2G G Mineral Industry

4.2H H. Military Installation

4.3 III. Projection of Land Uses in 1980, 2000, and 2020
Based upon requirements for land as determined in the Outline on Water and Related Land Resource Needs and Developments (See description of items under I).

4.3A A. Agricultural land

4.3A1 1. Cropland

4.3A1a a. Irrigated
4.3A1b b. Non-irrigated

4.3A2 2. Pasture and Range

4.3A2a a. Irrigated
4.3A2b b. Non-irrigated

4.3A3 3. Forest and Woodland

4.3A4 4. Other Land

4.3A4a a. On Farms
4.3A4b b. Not in Farms

4.3B B. Recreation Areas
Public and Private

4.3C C. Fish and Wildlife Areas
Public and Private

4.3D D. Transportation, Urban and Built-up Areas

4.3E E. Natural Water Areas

4.3F F. Water Resource Developments

4.3G G. Mineral Industry

4.3H H. Military Installation

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Part V

5.000 Water and Related Resource Development

PREAMBLE

The major function of work under this Chapter is to weave together into a balanced plan of development, the findings under the preceding work outlines on economic projections, present and future needs, and the availability of the water and land resources. From an examination of the needs of the basin, the general objective is to outline a framework plan which will provide for best use or combination of uses of the available resources. Full consideration should be given to alternate methods, both structural and nonstructural. When single-purpose requirement conflicts with competing uses, compatible combinations should be developed which will obtain optimum results. The framework plan will identify needs of subbasins and specific subareas and recommend methods for satisfying the needs. It will not necessarily identify exact sites or define basic area boundaries. Early attention will be given to the establishment of criteria or standards for guidance in the studies, such as acceptable evaluation standards.

The framework plan will be broad in scope so as to outline the characteristics of the projected water and related land resources problems and the general appraisal of the probable nature, extent, and timing of measures for their solution. The framework plan will be based on data available to the maximum practical extent. In most cases these data will be of reconnaissance grade. In some instances available data will be of a project detail type. The framework plan will serve as a guide to future planning and action programs.

5.1 I. The following data will be required from other sources for the completion of the framework plan.

5.1A A. Economic information including economic problems; projections of population by class, by area; projections of economic activities and expected development of production and services.

5.1B B. Projections of water and land resources needs. These needs will be developed, utilizing the economic projections and existing needs as indicated by an economic base study for that period.

5.1C C. Estimates of water availability in terms of quantity and quality will be provided by the work outlined on Hydrologic Projections. These data will be used in determining the adequacy of the water resources to meet the projected future requirements

5.1D D. Estimates of related land resources available by type, class and suitability of use will be provided through the studies outlined on Land Resources Availability. These data will be used in determining the adequacy of land resources to meet the projected future needs.

5.2 II. The Identification of Objectives, Criteria, and/or Guidelines for:

5.2A A. Reviewing all pertinent information for the purpose of arran available data on resources and estimating needs so as to develop criteria, and guidelines needed for formulation general plan of optimum development of the resources

5.2B B. Evaluating all suggested policy procedures, cri guidelines selecting those that merit conside development of comprehensive framework pl River Basin.

5.2C C. Establishing policy procedures, criteria, guidelines and objectives for management, regulation, and control of water and related land resources.

5.2D D. Establishing plans for the development of the resources to meet the projected needs. This would relate within practicable limits data regarding needs with appropriate available resources and give consideration to alternative plans where competition may exist for the available resources. In keeping with objectives adopted for each of the following:

5.2D1 1. Domestic municipal, agricultural and industrial uses of water

5.2D2 2. Water quality control

5.2D3 3. Navigation in relation to the Nation's transportation system.

5.2D4 4. Power

5.2D5 5. Flood protection, control or prevention

5.2D6 6. Land and bank stabilization

5.2D7 7. Drainage, including salinity control

5.2D8 8. Watershed protection and management

5.2D9 9. Mineral production

5.2D10 10. Mineral production

5.2D11 11. Grazing and cropland improvement

5.2D12 12. Outdoor recreation

5.2D13 13. Sport and commercial fish and wildlife protection and enhancement

5.2D14 14. Preservation of unique areas of natural beauty and historical and scientific interest.

5.2E E. Considering and evaluating Regional, State and Local objectives within the framework of the National objectives as they relate to existing and future conditions and needs. Identify any significant departures which are required to accomplish Regional, State or Local objectives.

5.2F F. Considering the effects of pertinent physical, economic and social factors beyond the study area.

5.2G G. Identifying the river basin commissions, interstate bodies, and State and Local agencies with whom the planning will be coordinated.

5.2H H. Classifying appropriate Federal and State laws and regulations and their general requirements that have substantial impact on policies, standards, procedures, or implementations that have a major effect on proposals or plan formulation.

5.2I I. Screening proposals to make selections of geographic areas and to make recommendations for kinds of project studies in individual subbasins.

5.3 III. Identification of present uses and programs for meeting current water and related land resources needs with the current availability of water and related land resources.

5.3A A. Accumulate data on resources developments.

5.3B B. Evaluate existing resources development in regard to the meeting of present needs.

5.4 IV. Prepare general plan for best use of water and land in the years 1980, 2000, and 2020.

5.4A A. Water resources developments.
Identify single and multiple purpose plans which can be coordinated into the Comprehensive Framework Plan permitting optimum use of the water resources for all purposes including municipal and industrial water, irrigation, power, quality control, navigation, flood control, recreation, fish and wildlife, etc.

5.4B B. Conservation and land use programs.

5.4B1 1. Identify plans which can be coordinated with the water resources projects. Special emphasis will be given to the following:

5.4B1a a. Land treatment
5.4B1b b. Irrigable land development
5.4B1c c. Recreation
5.4B1d d. Fish and Wildlife

5.5 V. Evaluation of general plan in comparison with existing or under construction (current) projects or programs.

5.5A A. Physical accomplishments

5.5B B. Economic effects

5.5B1 1. Degree to which it meets basin or regional needs

5.5B2 2. Exportable surpluses (to other basins)

5.5B3 3. Stability of basin economy

5.5B4 4. Costs and benefits (where available)

5.5C C. Effect on existing institutional arrangements.

5.5C1 1. Compliance with appropriate existing Federal and State laws or need for changes in law.

5.5C2 2. Compliance with existing allocations or water rights or needs for change in allocations or rights.

5.5D D. Public acceptance of the general plan

5.6 VI. Identify sites, areas, or programs which should be studied in detail with a view to initiation of construction in the next 10 to 15 years.

5.6A A. Projects or programs which require authorization by Congress.

5.6B B. Other projects or programs not requiring authorization by Congress.

5.6C C. State projects and programs.

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Part VI

6.000 History and Background

6.1 I. Legal

6.2 II. Indian Culture

6.3 III. Geologic

6.4 IV. Climate

6.5 V. Agencies

6.5A A. Corps of Engineers

6.5B B. Department of Agriculture

6.5C C. Department of Commerce

6.5D D. Department of Labor

6.5E E. Federal Power Commission

6.5F F. Department of Interior

6.5F1 1. Bureau of Reclamation

6.5F2 2. Bureau of Outdoor Recreation

6.5F3 3. Bureau of Indian Affairs

6.5F4 4. Fish & Wildlife Service

6.5F5 5. Bureau of Land Management

6.5F6 6. Geological Survey

6.5F7 7. National Park Service

6.5F8 8. Bureau of Commercial Fisheries

6.5F9 9. Bureau of Mines

6.5F10 10. Southwest Power Administration

6.6 VI. States

6.6A A. Missouri

6.6B B. Kansas

6.6C C. Nebraska

6.6D D. Iowa

6.6E E. Colorado

6.6F F. Wyoming

6.6G G. South Dakota

6.6H H. North Dakota

6.6I I. Montana

6.6J J. Minnesota